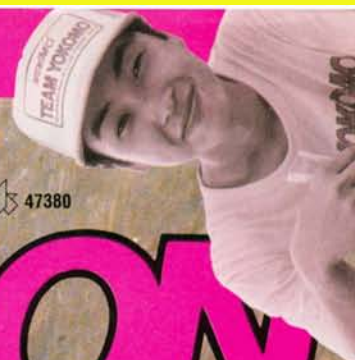


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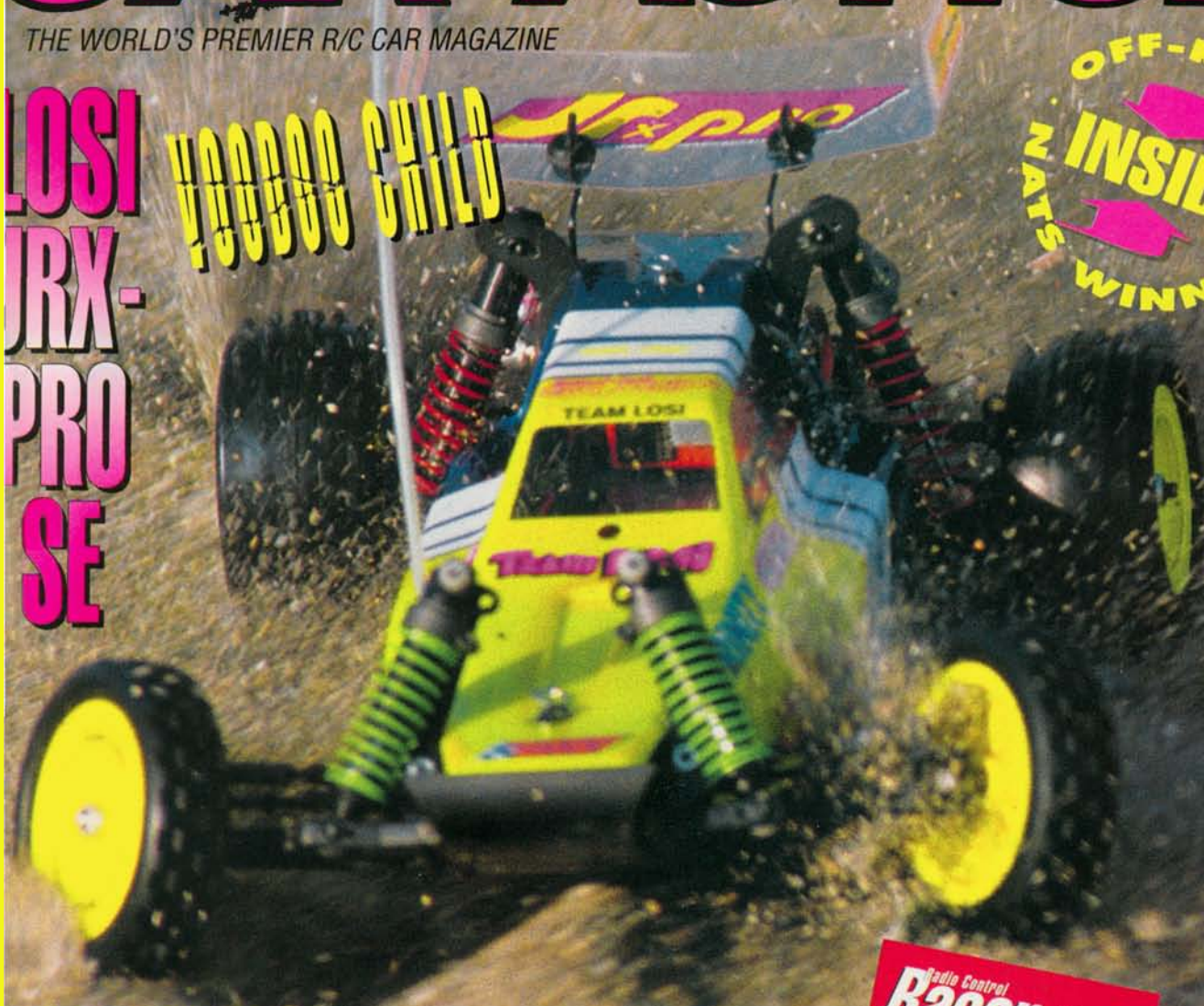
Radio Control **CAR ACTION**

THE WORLD'S PREMIER R/C CAR MAGAZINE

**LOSI
RRX-
PRO
SE**

WOODRIDGE CHILD

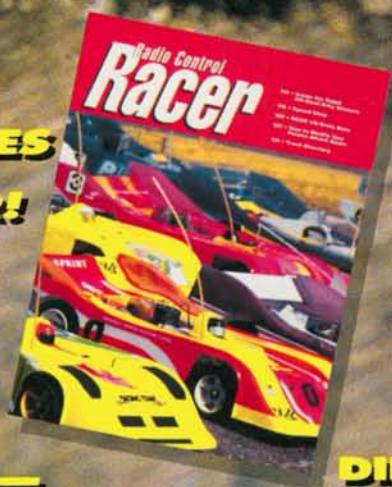
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Radio Control CAR ACTION

TRACK REPORTS

28
TEAM LOSI
JRX-PRO SE
by Frank Masi
New kit on the block



57
McALLISTER "00"
by Larry Cole
Double-"0" trouble

69
ROYAL HYPERSPEED
KAWASAKI
by John Huber
Bad motor scooter

93
MOSCOW MISSILE
by Jeff Bronstein
Ballistic Babushka

157
BOLINK LTO SS
by Larry Cole
Bo knows ovals



ROAR 1/8-SCALE NATS, PAGE 120

DEPARTMENTS

6
EDITORIAL
by Frank Masi

8
LETTERS

12
PIT TIPS
by Jim Newman

16
INSIDE SCOOP
by Chris Chianelli

20
READERS' RIDES

204
WHAT'S NEW

210
AD INDEX

COLUMNS

44
SCOPING OUT
by John Rist
Tekin 408S

52
TROUBLESHOOTING
by Frank Masi

62
NITRO NEWS
by Jeff Bronstein

74
TRUCK STOP
by Dave Sproul



ROYAL HYPERSPEED KAWASAKI, PAGE 69

RADIO CONTROL RACER

110
INSIDE THE ROAR
OFF-ROAD NATS
WINNERS
by Frank Masi
Cars of the stars

116
SPEED SHOP

120
ASSOCIATED/DELTA
ROAR 1/8-SCALE
NATS
by Jeff Bronstein
Combustion city!

127
MODIFY YOUR
FUTABA ATTACK
by Eloy Marez
Reversing your options

131
TRACK DIRECTORY

ON THE COVER: Team Losi's JRX-Pro SE dominates the cover. (Photo by Steve Pond.) Upper right—Masami Hirotsuka chowin' down between heats. (Photo by Bill Bacon.)

FEATURES

23
TD ENTERPRISES PIT-BOX II
by Alex Strouthopoulos • *Competition cargo carrier*

24
CAR ACTION INTERVIEW: MASAMI HIROSAKA
by Bill Bacon • *In-depth chat with the champ*

34
THOMPSON ELECTRONICS
MOTOR MASTER DYNO
by Alex Strouthopoulos • *Low-dollar dyno*

38
INSIDE MASAMI'S '89
STEALTH CAR
by Frank Masi • *Car Action exclusive!*

77
GET STARTED IN R/C, PART IV
by Bob Gagne • *Racing regulations*

87
NORRCA CARPET OVAL NATS
by Jim Shepka • *Revenge of the rug racers*

101
PROJECT BLUE EAGLE
by Alex Strouthopoulos • *Blues traveler*

106
HOME-BUILT PROJECT
by John Huber • *ZZ Top Pocket Eliminator*

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ZZ TOP

EDITORIAL

by FRANK MASI

HOW TO IMPROVE THE CHANCES THAT YOUR "READERS' RIDE" WILL BE PUBLISHED

EVERY MONTH, we receive hundreds of potential "Readers' Rides." Because we allot only two pages for them in each issue, we can only feature six or seven. Each day, our Junior Associate Alex "Rueben" Strouthopoulos spends hours scrutinizing the photos and info you send. According to him, only about a third of these "Rides" are possible candidates for publication. What happens to the other two-thirds? They go into "Readers' Rides Limbo," and they may never be used. To find out what separates the men from the boys in "Readers' Rides," read on.

The *quality of the photos* is extremely important. The most radical R/C project in the world might never make it to publication simply because the photo its creator took is out of focus. On the other hand, a sharp, high-quality picture might get an average concours winner into *Car Action*.

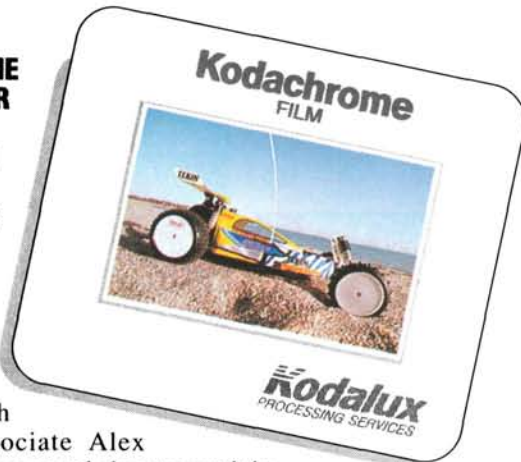
You've taken the time and effort to create what you think is a sure-fire, bona fide work of R/C art, so why not think carefully about how to photograph it. Don't just haul out the old Polaroid and shoot away! Here are a few tips to help you photograph your masterpiece properly.

● **Avoid distracting backgrounds.** You'd be amazed at the backgrounds many of our creative readers have used: picnic tables, kitchen tables with plaid tablecloths, dark wooden paneling, scantily clad women (we don't mind that; it's just that we can't publish such photos), etc. Unfortunately, these backgrounds draw attention away from the car. Why not shoot your vehicles in realistic settings?

● **Focus properly.** You can't control the focus on Instamatic-type cameras, so keep some distance between yourself and the subject. If you have a camera with focus control, use it! Also, stay as close to the ground as possible when you take the picture; you'd be surprised at the difference this makes.

● **Avoid bodily injury.** Leave the stunt work to Evel Knievel or, someday, you're gonna kill someone. Readers have sent pictures with such captions as: "Here's my modified Frog jumping over three of my friends." I hope they weren't *close* friends!

So that's the lowdown. Thinking about your photography will definitely improve the chances that you'll see your beloved R/C project in the pages of *Car Action*.



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LETTERS

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

STEER IT UP

I plan to buy a Clod Buster, but I don't know which type of servo to use. (I've considered Futaba S148 servos.) I haven't asked around yet, because I wanted to get the answer from the pros! I'm also the proud owner of an RC10 and a Big Bear. I've read your awesome mag for two years, and I've learned a lot. I hope you can answer my question, because I live

about 130km from the nearest hobby shop.

JOHN HIGH

Watrous, Saskatchewan, Canada

You can use an S148 servo for the throttle, but it isn't powerful enough for steering. It has 42 ounceinches of torque, which is fine for most cars and trucks, but a little weak for monster trucks (like the Clod), which have huge tires and 4WS. A Clod's tires make up almost half its weight, and an S148 servo will only turn the tires when the truck is moving. A servo with more torque will turn the tires whether it's moving or not. Futaba offers two new servos that are perfect for the Clod: the S3302 (110 ounceinches of torque) and the S9302 (99 ounceinches).

JH

SNOWED IN?

Do any companies make 1/10-scale snowmobiles? The hobby store near me has never heard of R/C snowmobiles. If they're available, do they come in gas or electric, and do they cost less than \$200? Keep up the great work.

TOM LLOYD
Corunna, MI

Well, Tom, I don't know if any manufacturers offer snowmobiles, but there are some alternatives. Vortex (108 2301 Avenue C North, Saskatoon, Saskatchewan, Canada S3C0 5Z5) offers a Winter Conversion kit that fits most popular 2WD off-road cars and includes skis (to replace the front wheels) and adapters that enable

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you to use dual rear wheels. If you feel like undertaking a custom project, we offer plans for a gas-powered Pushy Sno Sled in our Buyers' Mart. The Vortex Conversion costs \$19.95, and the plans for the Sno Sled cost \$9.50. AS

WHO'S FIRST?

I use a Novak 410 MXc with regenerative circuitry. I found an interesting article in the December '91 issue of *Popular Science* (page 32) in which a full-scale electric car is described: "Electric cabin heating and air conditioning are timer-regulated to minimize battery drain, which is partly offset by regenerative braking under electronic control that returns some

energy to the batteries when the car brakes."

Who invented regenerative circuitry: Novak, Tekin, or the Anglo-Swedish Clean Air Transport Company?

CHRIS MUELLER
Charlotte, NC

None of these companies invented regenerative circuitry. The technology has existed for many years, although it has only recently reached the R/C market. People have known for a long time that a motor can serve as a generator because the two are very similar. They're both electromotive devices, i.e., they can turn voltage into motion or motion into voltage. For example, it's possible to use a dynamic

speaker from a stereo system as a microphone.

It took a while to develop regenerative R/C speed controllers, because most of the components that were used were borrowed from radio and television. Because they had to be compatible with AC power, many of these components operated at 60Hz, which made it difficult to develop regenerative technology for R/C. In time, however, R/C companies began to design their own components, and they increased the pulse rate from 60Hz to about 2,500Hz, which made it easier to develop regenerative circuitry. Although each company developed its own circuitry design, all the designs are similar. JH

(Continued on page 10)

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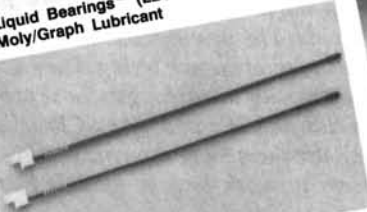
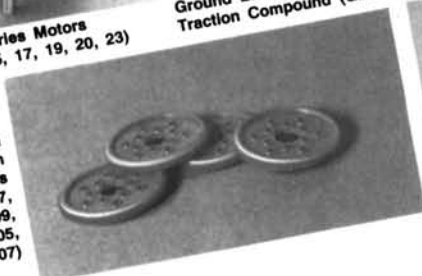


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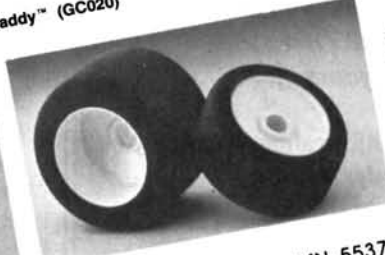


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LETTERS

QUICK REPLY

I own a Tamiya Thunder Dragon Quick Drive [QD]. Can you do a "Track Report" on Quick Drive cars? Your magazine is great; keep up the good work!

DALTON CARTER
Broken Arrow, OK

Wally David reviewed the Tamiya Thunder Dragon QD Dalton in the August '90 issue (page 100). If you don't have a copy of it, check out our "Back Issues" ad toward the back of this issue. AS

THREE "TWO" QUESTIONS

Your magazine is great! It helped me pick out a car—a Junior Two—and I've been successful with it at the track. Why weren't there many Team Losi drivers at the Worlds? Also, an article you did on the Junior Two said that it's not possible to use Losi's five-link suspension on the new composite chassis, but there are two holes on the side of the chassis for the bulkheads! Will this suspension fit, or do I need to make modifications? And are the new Panasonic P-170 cells good, or should I stick with Sanyo cells?

JOE LEONARD
Mattapan, MA

Joe, there were many Losi drivers at the Worlds, including Jack Johnson, Kyle Reed, Joel Johnson and Jay Halsey. They didn't all make the A-Final, but they were there.

You can use the five-link suspension on the Junior Two chassis without any problems, but it won't fit the new JRX-Pro SE chassis. The new Panasonic P-170 cells are definitely worth trying. The run times they provide are as long as those provided by Sanyo SCEs and, like SCR cells, you can use them more than once a day. They seem to work best in modified or 1/12-scale racing. AS

RADIO WAVES

I just recently re-entered R/C, and I was

amazed by the new technology—especially for radios! I own a Magnum JR and an Alpina PCM. I plan to buy a Futaba 3PB PCM, but I'd like to know what "PCM" and "PPM" mean. Are they useful? (No one around here seems to know.)

JEFF FORHAN
Honolulu, HI

Jeff, "PPM" (pulse-position modulation) and "PCM" (pulse-code modulation) refer to the way in which a signal is sent from the radio to the receiver. Radios usually broadcast on PPM, but a few, e.g., the Futaba and Alpina you mentioned, use PCM. Unlike PPM signal waves, PCM waves are pulses, so they resist interference very well. AS

PRO STUFF

I'm 12 years old, and I own a JRX-Pro that I've been racing for almost a year. It's a great car, but I have several questions about equipment. What's the best way to test a differential? (My diff is totally stock.) Can you suggest a fast stock motor that's suitable for an intermediate driver? Your mag is awesome, and I plan to get a subscription!

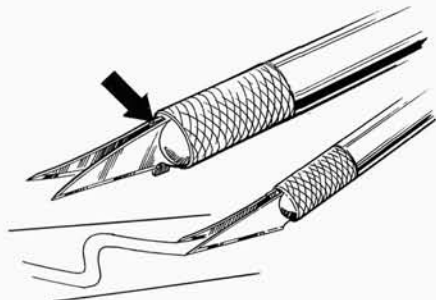
DYLAN ROSE
Seattle, WA

Well, Dylan, the best way to test the diff is to loosen it, put the car on the track, and punch the throttle. You'll hear a high-pitched whine caused by the diff when it slips. Tighten the diff an eighth of a turn, and run the test again. Repeat this procedure until the diff stops slipping, and then loosen it by a sixteenth of a turn. The diff should slip only slightly; if it slips too much, it will melt. Regarding fast stock motors, any '91 ROAR-legal motor is fine. Several of the "outlaw" stocks, i.e., those that have more than 24 degrees of timing and don't have comm-locking devices, will also work as long as you don't plan to race in a ROAR event. AS

(Continued on page 190)

PIT TIPS

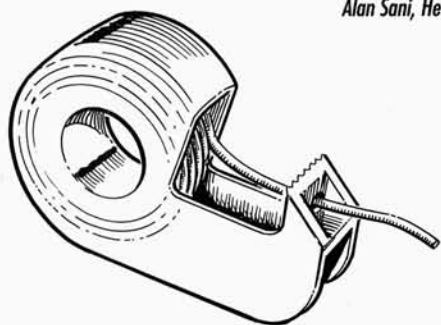
by JIM NEWMAN



STRIPING MADE EASY

Insert two no. 11 blades into your knife handle, and then wedge a piece of plastic between them as shown. The blades will spread as they're pulled into the handle, and this will give you a double edge with which to cut stripes of consistent widths.

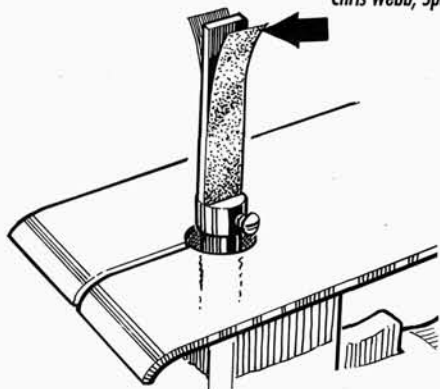
Alan Sani, Henderson, NV



SOLDER DISPENSER

Here's a great way to store solder that prevents it from developing those annoying kinks. Drill a small hole in the end of an empty tape dispenser, as shown. Loosely wind solder onto the dispenser, and pull it through the hole.

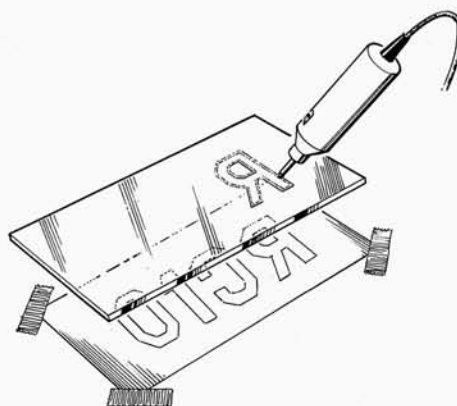
Chris Webb, Springs, South Africa



MINI POWER SANDER

If you glue strips of sandpaper onto both sides of a worn jigsaw blade, you can invert the tool in a non-damaging clamp, and use it to smooth the edges of a new body shell. Instead of a blade, you could even use a strip of suitable metal.

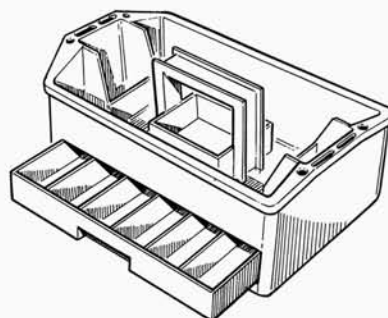
Tod Bray, St. Charles, MO



FANCY NUMBER PLATES

Cut a piece of clear plastic from an old cassette box, and then engrave your choice of numbers or letters on the back of it. The easiest way to do this is to draft the characters onto a piece of tissue, turn the tissue over and then put the plastic on top of it. Fill the engraved letters with enamel and, when they've dried, paint completely over the back of the plate. Then your personalized plate will be ready for your car.

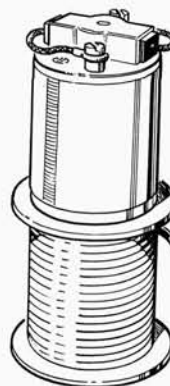
Ryan Carter, Hillville, NSW, Australia



READY-MADE TOOLBOX

You can find useful, convenient tool caddies of this type at your local supermarket. It has an open top, a drawer and many compartments in which to store items within easy reach. You can cover it with a white towel and do all your trackside work on it; the small parts will be easy to spot if you drop them.

Mike McPherson, Swartz Creek, MN

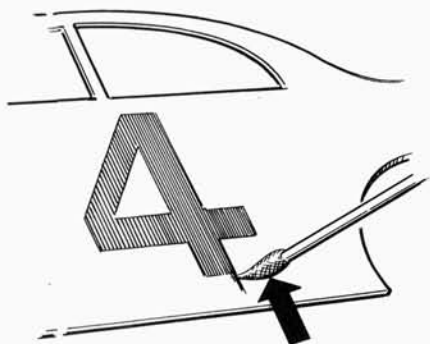


MAGNETIC MOTOR HOLDER

Well...not really. But when you set a motor on top of a metal solder bobbin, the motor's magnets hold it firmly in place. This makes it easy to work on the endbell.

Jerry Phillippe, Taylor, MI

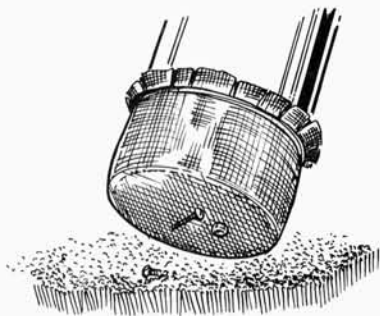
PIT TIPS



MISTAKE REMOVER

If the brush slips while you're painting numbers, etc., on your car, try this. Moisten the end of a Q-Tip with thinner and twirl it to make a point. Use it to remove the unwanted artwork very neatly.

Jared Rothman, Weatogue, CT



LOST-PARTS FINDER

The next time you drop small screws on a rug, try this. Tape a piece of nylon stocking over the end of a vacuum cleaner hose and then go a-sweeping. The small items will "jump" out of the rug pile and be trapped against the nylon screen.

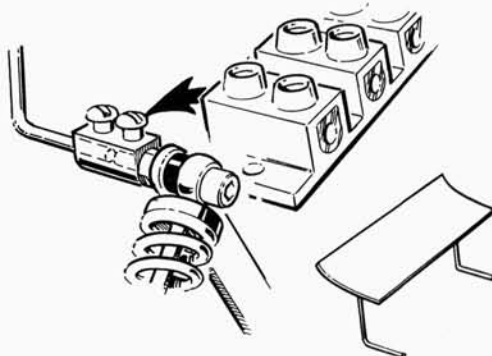
Art Singtoros, Burbank, CA



EASY-REFERENCE INDEX

Make photocopies of *Car Action* contents pages, slip them into a three-ring binder (in chronological order) and use a highlighter to mark the articles that interest you. Now you don't have to thumb through every back issue to find the information you need.

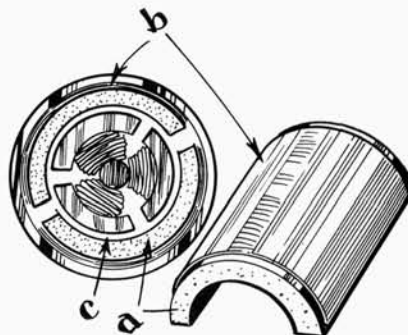
Tom Cunningham, London, Ontario, Canada



CONNECTOR WING MOUNT

Remove the metal insert from a Radio Shack strip connector. Clamp one end of the insert to one of the shock-unit screws and the other end to a wing-mounting wire, as shown. Repeat this procedure on the other shock screw.

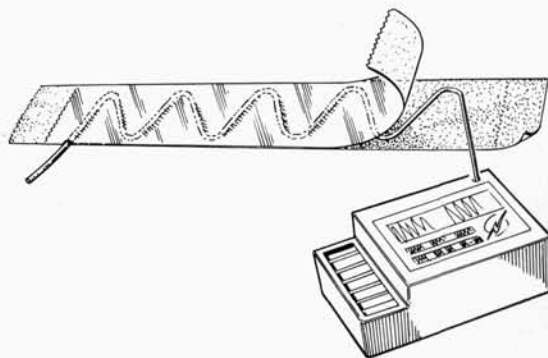
Greg Mawson, New Plymouth, New Zealand



MOTOR TUNE-UP

Remove the magnets (a) from your motor, and apply a layer or two of Mylar tape (b) to their convex sides. This will position the magnets closer to the armature and reduce the air gap (c), which should be between $1/32$ and $3/64$ inch wide.

Jose Luis Garcia Martin, Madrid, Spain



ANTENNA SHORTENER

Zig-zag your antenna along a piece of tape, and then put another piece of tape on top of it. Leave the ends of the first strip of tape exposed so that you can secure the assembly to the inside of the car.

Joel Navarro, Escondido, CA

Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

INSIDE SCOOP

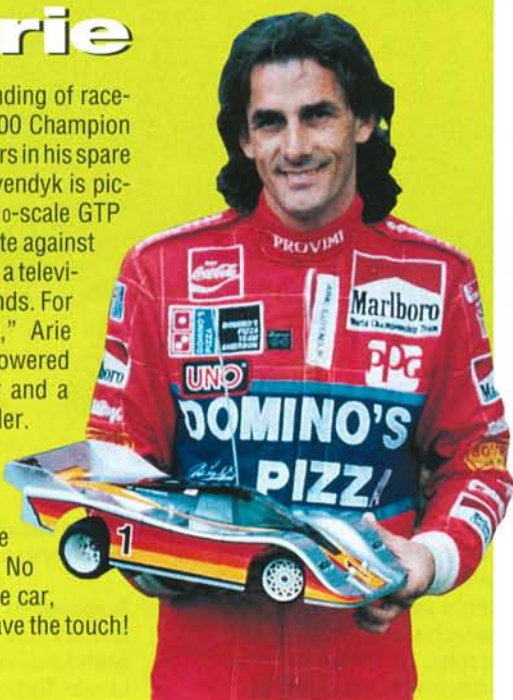
by CHRIS CHIANELLI



An Alleged Editor's work is never done, especially if he takes orders directly from the exalted one himself, Louis "El Commandante" DeFrancesco, our group publisher and "parter" of the R/C waters. I'm so busy that I have very little time to run much of the stuff I write about. There's a payoff though: I get all the late-breaking news before those other "fish-wrap" rags—revenge is mine! Anyway, I work for El Commandante, and we all work for you. So many scoops, so little time....

R/C Arie

To increase his understanding of race-car dynamics, '90 Indy 500 Champion Arie Luyendyk runs R/C cars in his spare time. The Dutch-born Luyendyk is pictured here holding the 1/10-scale GTP car that he used to compete against other top Dutch drivers on a television show in the Netherlands. For 1/10-scale "road-holding," Arie uses an Associated 10L powered by a Reedy Mr. D motor and a Novak 410-M1c controller. Only after a knock-down, drag-out battle with Dutch National Champion Jan Lammers was Arie able to snag first place. No matter what the size of the car, Mr. Luyendyk seems to have the touch!



Trinity's latest outlaw "stock" motor—the Monster Horsepower Jr.—features Trinity's highly successful, revolutionary "slotted" armature technology (which, by the way, has nothing to do with the motor's illegal status), a short-stack armature and 36 degrees of timing. All of these features make the Monster Horsepower Jr. the fastest of the outlaws; the last two, however, make it quite illegal!



WAY-OUT-LAW



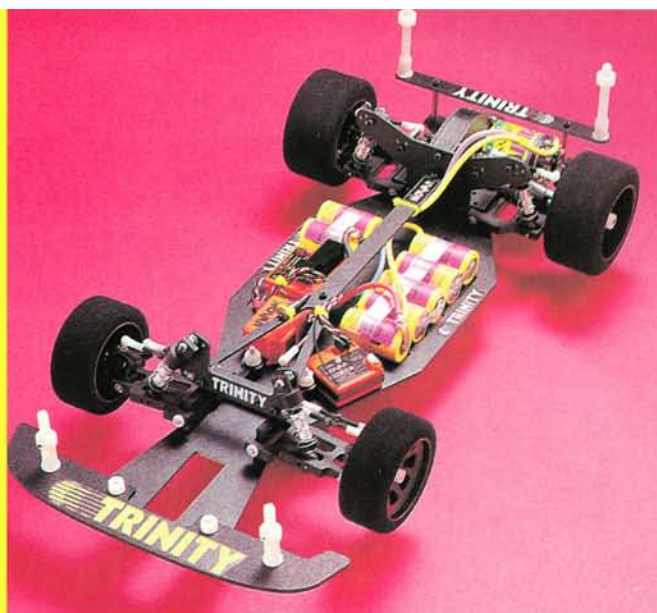
JR Remote Control has taken its extensive computer-technology experience (gained while developing the X-347 and PCM 10 aircraft radios) and applied it to its new 3-channel R-756. It has a programmable, PCM/PPM transmitter (the PPM setting makes it compatible with most FM receivers); a dot-matrix menu display; an alarm that sounds whenever trims

changes are made accidentally; a 75-lap, time-storage capability (to help you analyze the effectiveness of each performance modification); adjustable brake and throttle curves; a steering differential; a servo sub-trim; and other features too numerous to list here.

PROGRAMMABLE
JR PROPO

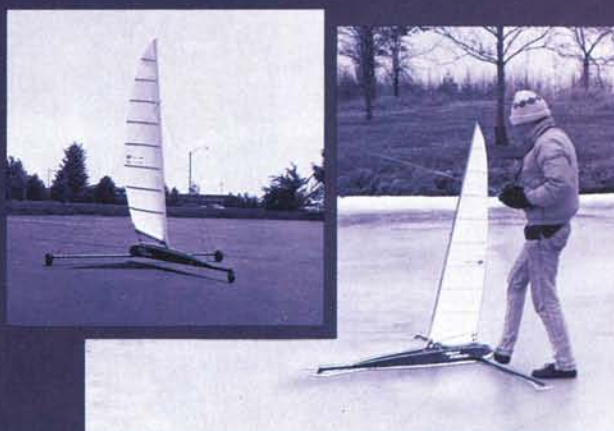
TRINITY ENTERS THE CAR MARKET

Trinity Products has introduced its exclusive new ReFlex 10 car. Designed by ROAR and NORRCA champion Jim Dieter, this 2WD dirt-oval car has many high-tech features, including a fully enclosed, graphite, direct-drive transmission; graphite drive shafts that reduce its unsprung weight; rear toe-in adjustment; graphite suspension arms on all four corners; 18-degree steering blocks and kingpins that help to reduce high-speed push; and a graphite chassis with a longitudinal stiffener that makes this car extremely rigid. Sounds like state-of-the-art technology to me.



main-man-Magic

Joel "Magic" Johnson has done it again! He took his fifth victory at the Cleveland Indoor Champs (no one else has managed to win more than twice in the race's 11-year history). In 4-cell competition, there's Joel and then there's the rest. A Trinity Championship Edition modified "Buzz Saw" motor powered his Associated 12L from the pole position—a spot with which Joel is very familiar. He held the lead all the way, and he won by a lap over Mike Ebert, last year's champion. But wait! Joel did this using Panasonic P-170 SCR Trinity Pushed Cells! These new cells are showing up in more and more of the big boys' pit boxes.

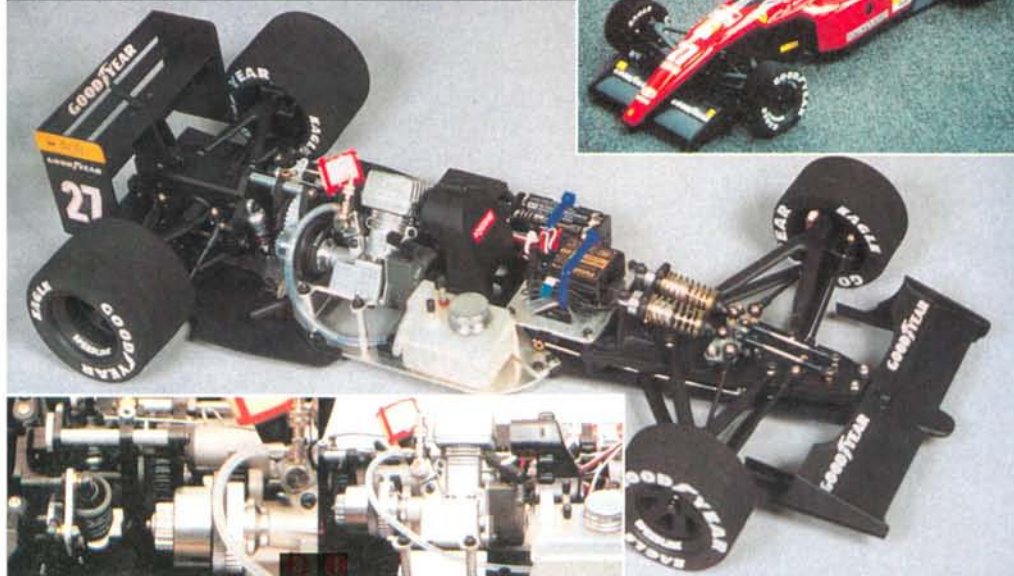


By Land or Frozen Sea

The speed of the Reid Co.'s Meanstreak iceboat/ "wheelboat" is limited only by the strength of the wind. This scale model of the world-famous, super-fast "Skeeter" features a sleek ABS-plastic body and a high-aspect, fully-battened sail. It comes with wheels or skates, but you can also order both to enjoy year-round racing on land or ice. According to Reid Co. representatives, the Meanstreak can make tight, high-speed turns going with the wind or against it. Kits are available directly from the Reid Co., 304 W. Hill St., Champaign, IL 61820; (217) 352-0584; Fax (217) 352-0337.

R/C Formula 1 racing is extremely popular in Japan, so the release of this .10-powered, 1/8-scale, F 1 chassis should come as no surprise. The car has a pull-start engine, oil-filled coil-over metal shocks, a metal-reinforced chassis and scale-like front and rear suspension components. There hasn't been any word on availability yet.

Formula Fuel

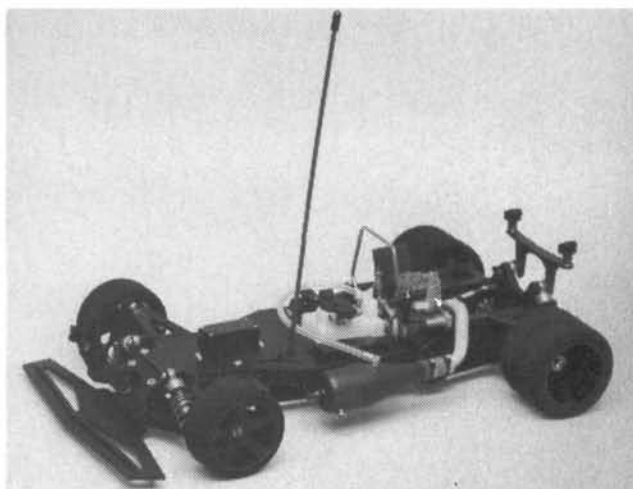


Impact 10

Serpent's 1/10 scale gas-powered racing car

STRONG, RELIABLE AND EXCITING

- pre-assembled rigid chassis
- independent suspension with hydraulic shock absorbers
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- rear-positioned silencer
- a unique body-mount system
- easy radio installation
- low maintenance and running costs
- Audi Quattro or Nissan 300 ZX body included



(Shown with optional tuned pipe)

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READERS' RIDES

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If the Ayatollah chooses your photo, you'll receive a one-year subscription to Car Action, or an extension to your existing subscription. You'll also be eligible for the third annual "Reader's Ride of the Year Contest" in the fall of 1992. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



■ KODAK CREATION

Mike and Elizabeth Kornides of Latrobe, PA, were inspired by Ernie Ivan's Daytona 500-winning Kodak Chevy Lumina. The Kornides completely hand-finished the body, mixed the paint and made and custom-cut the decals (except those on the fender).



■ MA (BELL) WOULD HAVE BEEN PROUD

Steve Stone of Memphis, TN, works for South Central Bell. He created this van, which started as a Parma Hemi Coupe! With a little imagination, Steve painted a MRP Van Am GT body in traditional phone-company colors and he scratch-built the ladder and the hooks. With a fleet of these, perhaps the phone company could give "speedy service" a new meaning!

■ PURPLE PEOPLE EATER

Brandon Sweeney of L'Anse, MI, sent us this photo of his latest creation—a big, bráwny Traxxas Blue Eagle. Brandon mounted the Cjod Buster wheels and USA-1 tires using CCP wheel adapters; and he painted the USA-1 body with Candy Purple paint to set off the chrome. To power and control the truck, Brandon uses a Novak 610 speed controller, dual 1500mAh Duratrax batteries, a Speedworks Monster Mash motor and a Futaba PBKA radio system and S9302 servo.



Support Your Local Hobby Shop!

Hot GRAPHICS

INSIDE APPLICATION FOR CLEAR BODIES



■ WESTERN WINNER

Darrel Waltrip's Western Auto Lumina has become a very popular 1/10-scale subject. This replica, by Daniel J. Rózum of Pierron, IL, is one of the finest we've seen. Underneath the finely detailed Associated body is an RC10 graphite chassis that's equipped with a Novak T-4 speed controller, an Airtronics XL2P radio and a variety of motors and batteries. Daniel says he wins half the races he enters!



■ JOURNEY'S RIDE

Sgt. John Applegate, who is stationed in Holland, sent us this picture of his Traxxas Hawk. John has modified his truck slightly with Team Losi X-Pattern rear tires, hand-cut, staggered-rib fronts, an 18-turn Mega Motor and a Futaba radio system. The paint job was inspired by the cover art on the rock band Journey's album "Escape."



■ FLYING EAGLE

Stationed at Seymour Johnson Air Force Base in North Carolina, long-time R/Cer Eric Troutman races his Traxxas Blue Eagle whenever he can. He decided to keep his Blue Eagle mostly stock, adding only a Twister 15-turn motor and a KO Propo radio system.



Inside Stick HOT NUMBERS



Duane Abrego, (R) Thunderdrome concurs winner, is congratulated by Eagle's Gino Filippi.

Customizing your R/C has never been easier... it's as simple as CUT, PEEL and STICK. Eagle Products combines hot graphics, state of the art materials and the ease of peel and stick application to give your machine the look that sets you apart.

So whether it's asphalt, dirt, water or air, get there faster than anyone else with

Eagle Products!

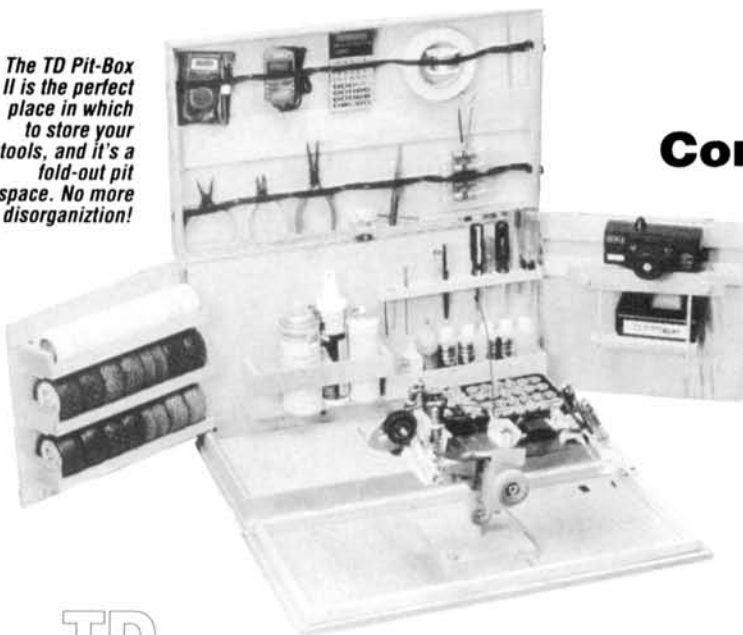
R/C GRAPHICS
EAGLE
P R O D U C T S

GET 'EM AT YOUR LOCAL HOBBY SHOP
OR SEND \$2.00 FOR OUR 1992 CATALOG
AND A SAMPLE STICKER!

754 Dodworth / P.O. Box 4609, Covina, CA 91723

The TD Pit-Box II is the perfect place in which to store your tools, and it's a fold-out pit space. No more disorganization!

Competition cargo carrier



HAVE YOU NOTICED how much useless equipment some people take to the track? You know—small toolboxes, crates, bags and armfuls of “essential” equipment? After making 20 trips from their cars to the pit area, these people usually spread everything out and take up as much space as possible.

You can imagine how relieved I was to see the TD Enterprises* Pit-Box II. It's a large, birch box that can hold everything you'll ever need at the track, and it becomes a compact pit space when you open it. It even has a fold-

by ALEX STROUTHOPOULOS

TD ENTERPRISES PIT-BOX II

down work tray and a car stand. Towels, stands and tools don't litter my pit area anymore thanks to this pit box.

INNER WORKINGS

On the front tray, the box has a three-way, adjustable stand that holds the car securely and facilitates assembly and repair. Because it's attached to the front tray, you can store the car on it when you close the box.

On the left door there are three racks that can hold up to seven off-road and eight on-road tires and wheels. (I don't take that many tires to the track, so I use the top rack to hold a roll of paper towels.) The right door has a unique radio holder that you can use with pistol-

grip and most stick radios by adjusting the depth and height of the two braces. For even more protection, cover the wooden parts that touch the radio with foam.

The box's most intriguing feature—a tool holder that you can customize to hold a variety of tools—consists of a thick elastic band stapled to two wooden strips that run lengthwise inside the lid. Just put any tool you like, e.g., pliers, tapered reamers, digital voltmeters, calculators, etc., between the elastic and the wooden strips, pull the elastic tight and staple it. When you close the lid, the elastic holds the tools in place securely.

The box's back wall holds two shelves and a rack. The shelf on the left is perfect for cans of motor spray, traction compound, or compressed air; the one on the right, shock oils, glues, or comm drops. The tool rack (above the right shelf) is a piece of wood into which holes of different diameters have been drilled. You can store Allen wrenches, screwdrivers, X-Acto knives and toothbrushes in it.

The floor of the box is bare, and you make your own compartments using the supplied wooden slats (the instructions provide several design ideas and templates). I only used one slat to make an area for my battery case and my crystal case.

FINISHING

The box comes unfinished, so the choice of stain, paint, etc., is up to you. You should use a sealant to protect it from shock oil, water and motor spray, all of which can cause the wood to warp. Any stain will work, but be sure to cover the inside and outside of the box entirely. Why not paint the box in your team colors, or cover it with decals? Be original! (I took the easy way out by finishing mine with an all-in-one stain/sealant.)

FINAL THOUGHTS

Although the TD Pit-Box II lacks places in which to store small parts (you can solve this by mounting a parts organizer on its floor), it's perfect for people who have a lot of equipment. Be careful, though; the box can become heavy very quickly—almost too heavy to carry! You might want to tote it to the track on a collapsible luggage carrier. The TD Pit-Box II is a great investment—a pit box and pit space all in one!

**Here's the address of the company featured in this article:
TD Enterprises, P.O. Box 3301, Lexington, OH 44904.*



When folded, this pit box measures only 25x14 1/2 x 14 5/8 inches. High-quality clasps ensure that it won't open during transportation.

CAR ACTION INTERVIEW

MASAMI HIROSAKA

THE
MASTER
SPEAKS

by BILL BACON

MASAMI HIROSAKA is, without a doubt, one of the most famous R/C racers. He has captured an unprecedented five IFMAR World Championship titles, including one in 1/12 scale—a testimony to his versatility as a driver.

Since Masami's arrival on the world-level R/C racing scene with his victory at the '87 Off-Road Worlds (as an unsponsored driver), *Car Action's* loyal readers have been clamoring for the inside scoop from the Master himself. To satisfy the curious R/C public (and ourselves!), we sent *Car Action* correspondent Bill Bacon to Japan to interview Masami. Bill speaks Japanese fluently, and this eliminated the language barrier that has kept many from getting to know Masami better.





BB: How old are you, and how old were you when you drove your very first R/C car?

MH: I'm 21 years old now and, I guess I was around seven years old when I got my very first car as a gift from my dad.

BB: What kind of car was it?

MH: It was a Tamiya Countach.

BB: Did you start racing immediately, or did you drive just for fun initially?

MH: Well, I actually got right in to it when I was seven. My dad had been involved in this hobby before then and, as soon as he got me a car, I started to go out together with him.

BB: I know that your father is now your mechanic. Was he always involved with your interest in R/C?

MH: Well, yes, he was. We had been racing together for about four years. But afterward, he found out that I was a lot better than him, so he quit racing at that point and decided to concentrate as my mechanic.

BB: Is it true that you weren't even sponsored when you became World Champion?

MH: Actually I was sponsored by HPI Japan just for the power source.

BB: I've read that you went to the '87 Worlds in Romsey, England, without a 4WD car, bought a Schumacher Cat, which you built at the race, top-qualified and then won the event. Is that what really happened?

MH: At that time, I was a private racer and, of course, I had my own car prepared. However, we only had the short-wheelbase [SWB] Schumacher, which was the only car available in Japan at that time. We expected to see the XL version before we left for the Worlds but, unfortunately, we couldn't get hold

of one in time. So we had no choice but to take our SWB Cat. We had a control practice on the day before the race, and I took my Cat and practiced with it. I felt quite comfortable with the handling of the car, but I noticed that the majority of drivers were using the long-wheelbase Cat. On the same day, while we were having our dinner, the president of Schumacher visited us and brought a Cat XL that was completely built. So we installed the radio gear in this new car and had two cars (the XL and the normal one) ready to go for tomorrow's race. On the first round, I tried the XL version and was surprised by the way it handled! Not only did this car handle better than the SWB Cat, but it also was perfectly matched for that track. So, right off the bat, without a practice, I took this car and drove it all the way to the Championship.

BB: This was your first World Championship victory. How did you feel after winning?

MH: At first, I could not believe myself. Several months later, I began to feel what I really am and what I've accomplished at the Worlds.

BB: I'm sure that sponsorship offers came flooding in after your victory in '87. How is it you chose Yokomo and then Associated?

MH: I did have a lot of offerings for sponsorships after the Worlds, but I decided to work with Yokomo. The reason I chose Yokomo? Well, it was kind of an ambiguous thought, but let's just say that I simply wanted to work with them.

BB: Is it true that you work at Yokomo?

MH: Yes. I have been working at Yokomo for over three years now.

BB: What's your job title, and what do you do there?

MH: I am a sales engineer. My main job is to take orders from local hobby shops, pack merchandise, and travel to different places to demonstrate our products. And, as a part of that feature, I race all over the world to show the performance of our product.

BB: Is your father also associated with Yokomo?

MH: Yes. He works at the R&D department where he develops and tests new products.

BB: Can you tell us a little about the new Yokomo 4WD Works '91 car, and when—or if—we can expect to see it in the U.S.?

MH: We basically redesigned the whole suspension area in this car. The long-span A-arms are probably the longest in its class. The chassis is redesigned for better weight distribution and flex characteristics. It also comes with a new sleek body and almost comes with every option available for the car. Currently, we are not sure about its release date for the United States, but you can expect to see it sometime next year [1992]. As to the price of the car, we would like to keep it in the same price range as the YZ-10.

BB: Does Yokomo have any plans to produce a 2WD car in the future?

MH: At this point, the answer would be "no." Our company was originally dedicated to make 4WD cars only (as our original Dogfighter). However, we are now ready to put out a new 1/10-scale, on-road sports car—the Honda NSX. This car is designed for those enthusiasts who like full-scale cars. This car is detailed from the door mirror to the interior. The body is scaled down from the real NSX (owned by Mr. Yokobori, the president of Yokomo), thus the contours and dimensions are exactly the same as the real car.



BB: You managed to win both 2WD and 4WD World Championships in '89. At the time, did you think that you could have done so well?

MH: Well, since I've won the previous title, I had no doubts about it, as long as my car was set up right. This time, however, it wasn't my private race anymore. I had to work as a team, as a part of Yokomo. Working as a team really worked out well, and we were fortunate to TQ and win both classes.

BB: There was a lot of controversy in Australia concerning the Yokomo 2.2-inch rims and tires. Do you feel that these rims and tires gave you any significant advantage?

MH: At the '89 Worlds, there wasn't a rule concerning the size of tires and wheels we brought. As to the advantage of these oversized wheels, there wasn't a significant advantage, but it really matched well with the tires and the track.

BB: To recap your performance at the recent Off-Road Worlds that were held in Detroit: you retained your 2WD title and placed 2nd in the 4WD Class. This is an exceptional finish. Are you pleased with your performance?



Bill Bacon (second from right), Masami (second from left) and other racers at the '91 Japanese Off-Road Nationals. Masami won the 2WD and 4WD classes.

MH: I am very pleased with the results. I didn't expect to win 2WD that time. But I was fortunate enough to win it and was able to contribute for Team Associated.

BB: Have you dried off from your "victory drenching" yet?

MH: No!

BB: Although you're most widely known for 1/10-scale off-road, you've also won a World Championship in 1/12-scale on-road. What's your favorite type of racing, and why?



MH: I like both 1/10- and 1/12-scale racing. They are both fun in different ways. Many times, people ask me why I don't do gas-powered cars. The thing is, my hands are full right now, and I don't have the time to race gas-powered cars. And, if I did, I would lose concentration on the electric-powered cars.

BB: Do you find that racing in other countries, such as the U.S., is different from racing in Japan? In what way is it different?

MH: In Japan, racing mood is very tense. Only the person who wins gets all the attention, and people who come in 2nd and 3rd can't go home satisfied. When I come to the U.S., I find that all participants enjoy the race whether they win or lose. Even if it's not A-Main, I see the crowd go wild and cheer for the racers. I don't see this happen in Japan too often. The thing is, Japanese people don't know how to enjoy the race. They get bored right away with new stuff. In that sense, I am fond of the American racers who know how to "enjoy" this great sport.

BB: I've heard that you do an incredible amount of practicing. Exactly how much do you practice?

MH: On ordinary days, I don't practice much; but when it comes near to a major

race, I practice about 100 packs [runs] a day once or twice a week. But mostly I get my practice from on-road where I can train my reflexes.

BB: Is practice the key to your racing success?

MH: Of course practice is important, but I feel there is something much more important. To me, patience is the key word. In some cases, you might fall behind the leading pack. Most people in this circumstance will get frustrated and push him/herself and try to catch up to the leader. In such situations, there is a good chance that you would make a mistake and even fall further behind. You must stay cool and be decisive of that situation and play your own game.

BB: Being a World Champion, do you feel pressure to do well at every race you attend? Do you feel you *have* to win?

MH: Yes, I do feel pressure about it. Not that I have to win every race, but I don't want to show people absurd driving that will embarrass the name of the World Champion, so I always try hard to demonstrate the best of my driving.

BB: If you could change anything at all in the R/C industry, what would it be?

MH: I would like to have more people get involved in this great hobby. To do this, I'd like to reinforce the entry level for the younger racers and create a race class for their level. I'd like to see different race levels, just like in the real cars.

BB: What will Masami Hirosaka be doing five years from now?

MH: I'm not so sure, but I could say that I would still be working at Yokomo. Maybe I could teach racers some of my driving techniques. Maybe I'll be a team director by then, I hope!

BB: On behalf of Car Action, I'd like to thank you for taking the time to do this interview, and congratulations on your fifth World Championship title. You certainly deserve it. ■

TEAM LOSI

JRX-Pro SE



b y F R A N K M A S I

THE TEAM LOSI® JR-X2 was the first serious threat to Team Associated's venerable RC10 and its domination of the 2WD off-road class. Never a company to rest on its laurels, Team Losi has been continually updating its JR series, first with the Proformance kit, which allowed owners to transform their JR-X2s into a version of Jack Johnson's '89 Nats

winner. The modifications contained in the Proformance kit were then incorporated into the JR-X2 kit, and the result was the JRX-Pro, which enjoyed much of the success of its older sibling.

Since the Pro's release, Gil Losi Jr. and company have been developing the next generation of the JR-series lineup. Many of the innovations from their extensive R&D can be found

in Losi's prototype car, which was campaigned with great success at the '91 IFMAR Worlds in Detroit. Among these innovations, there are several standouts.

One of the most original ideas ever to appear on an R/C car has to be Losi's Hydra-Drive traction-control system (see sidebar). In addition, the Losi prototype uses a narrow, light version of the Junior



Hell on wheels

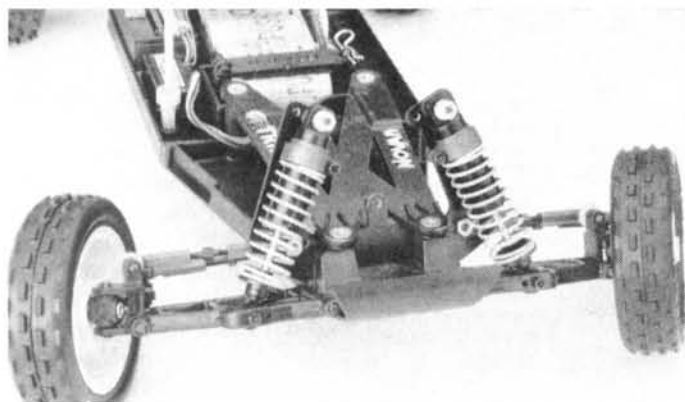
■ **Shocks**—Use the kit shock oil (Team Losi 40W) and red springs in the rear shocks. Up front, 50W Losi oil “desensitizes” the suspension, and this allows the car to turn in a little better on smooth, slippery tracks. The kit’s green springs are used up front.

■ **Static Adjustments**—Camber: about 2 degrees of negative camber (tops of the tires leaning toward the car) on both the front and the rear. Toe-in/out: With the car in race-ready trim (i.e., battery, motor and all gear installed), the front wheels should have neither toe-in nor toe-out. Use pivot support no. 1 (included with the kit).

■ **Ride Height**—Again, with the car race-ready, drop it from a height of about 6 inches. When it comes to a rest, the rear driveshafts should be slightly *above* level, and the front arms should be about level.

■ **Differential and Slipper**—The diff shouldn’t slip under *any* conditions. Adjust the friction slipper so that it slips for about one foot when the car accelerates from a standing start.

**Jack
Johnson’s
Pro SE
Setup**



The SE uses short versions of Losi's new Hard Body shocks, which feature hard-anodized/coated bodies. A new shock tower is also included.

Two's molded fiber-matrix chassis—not the graphite composite that most manufacturers use.

Coinciding with the prototype's 3rd-place finish at the Worlds, and its sweep of the 2WD class at the '91 ROAR Nats (see coverage in the March '91 issue of *Car Action*), Team Losi has introduced its prototype car in production form. The JRX-Pro SE boasts an impressive list of new and updated equipment that's sure to make it one of the top performers at tracks

around the world—right out of the box!

SPECIAL EQUIPMENT

Compare an SE with the standard Pro, and you'd think you were looking at two completely different cars.

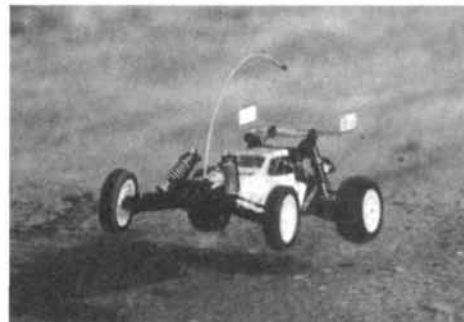
● **Chassis.** The SE uses a revised version of the extremely rigid molded chassis developed for the Junior Two. The SE's chassis is slightly narrower and has two sets of mounting holes for the rear bulkhead and transmission. This extra set of holes allows

you to change wheelbases should the need arise. In addition, the SE's chassis has had some of its material "milled away" to save weight. As with the Junior Two, a molded upper plate strengthens the front suspension bulkhead and prevents flexing.

● **Front Suspension.** Up

signed for use with the swept arms, and it offers three upper shock mounting positions for additional adjustability. The durable bulkhead is carried over from the JRX-Pro, as are the car's in-line steering blocks and axles, which minimize tire scrub when the car turns.

"The JRX-Pro SE boasts an impressive list of new and updated equipment that's sure to make it one of the top performers at tracks around the world"



front, Losi has included new "swept" front A-arms that significantly improve the car's steering response (the previous Losi cars had a tendency to understeer). A brand-new shock tower has been de-

● **Shocks.** Losi's new Hard Body shocks come directly from the prototype Worlds car. They feature hard-anodized/coated bodies, new, three-hole Teflon pistons and dual O-ring shock cartridges

TEAM LOSI JRX-PRO SE

Type 2WD Off-Road
Scale 1/10
Sug. Retail Price \$299.95

DIMENSIONS:

Overall Length 15 inches
Width 9.875 inches
Wheelbase 10.875 inches
Front Track 8.312 inches
Rear Track 8.25 inches

WEIGHT:

Gross (with battery) .. 3 pounds, 9.34 ounces

BODY:

Type Team Losi "Slim-Line"
Material Polycarbonate

CHASSIS:

Type Molded
Material Matrix fiber resin

DRIVE TRAIN:

Primary Pinion/spur
Transmission Gear reduction (2.18:1)
Differential Ball
Bearings/Bushings Sealed ball bearings



SUSPENSION:

Type (f/r) Single A-arm/upper camber link
Damping (f/r) Oil-filled, coil-over shocks

WHEELS:

Front: Type One-piece
Dimensions (DxW) 2.1x.75 inches
Rear: Type One-piece
Dimensions (DxW) 2.0x1.375 inches

TIRES:

Front Team Losi HT staggered ribs
Rear Team Losi HT X-patterns

ELECTRICS:

Motor, battery, speed controller Not included

OPTIONS AS TESTED:

Airtronics Caliber 3P FM transmitter, KO-Propo PS-303 FET servo, Novak NESC 410-M1c electronic speed controller, Trinity Pushed Team Panasonic P-170s, Trinity Championship Series Speed Metal 12-turn triple motor, RPM Losi Junior ESC tray, Jumpin' custom paint work, Trinity Power Plug connector.

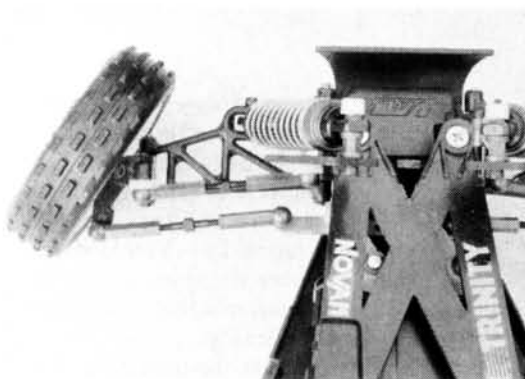
COMMENTS:

With the release of the Pro SE, Losi has once again raised the stakes in the 2WD off-road class. Overall high quality combined with relatively inexpensive parts (the replacement chassis retails for only \$26.95) makes an attractive racing package. Features such as the slipper clutch and hard-coated shock bodies keep the SE up to current technological standards.

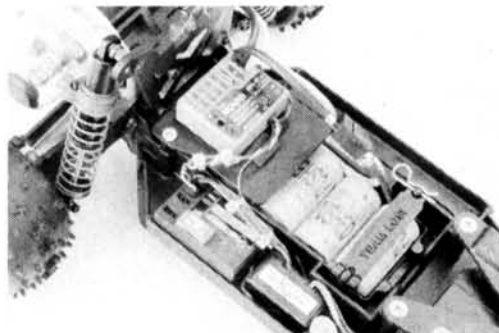
JRX-PRO SE

that replace the old Losi cartridges (which, because of their internal "volume compensators," were likely to leak slightly). Up front, Losi switched from the Pro's long shocks to short shocks.

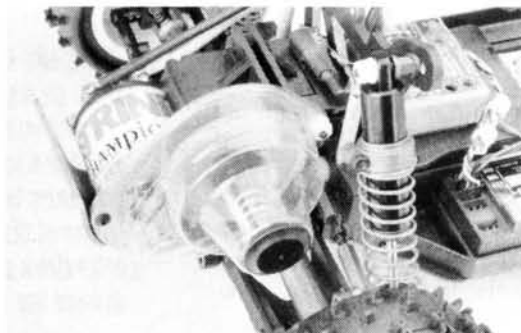
Also new are Team Losi's coil-springs, which feature closed, ground ends and pow-



The Pro SE uses Losi's "swept" front A-arms for improved steering response. New tie-rod ends with more material for the rods to thread into, and foam dirt shields for the camber rods are also part of the SE package.



RPM's ESC tray for the molded Losi chassis provides ample room for mounting any size ESC. The Airtronics Caliber's stock receiver fits in the chassis bay perfectly. The small FET booster is for the KO servo.



The SE is equipped with Losi's new friction slipper clutch that will accept the Hydra-Drive unit (when it's available). Massive horsepower was provided by the Trinity Speed Metal 12-turn, triple-wind modified motor.

der coating. They're designated by both length and compression-rate (as opposed to merely color). Green springs (2 inches long x 3.5 rate) are used on the front shocks, and

Losi's new red springs (2.5 inches long x 2.6 rate) are used in the rear.

The extra-long rear shocks also feature hard-anodized/coated bodies and Teflon pis-

tons. (Note: if you're building an SE, make sure that you read the instructions carefully. Pay particular attention to the placement of the shock pistons. The piston marked "4"

must go in the front shocks, and the one marked "5" must be installed in the rear.)

• **Rear Suspension.** The rear suspension retains nearly all the JRX-Pro's components (i.e., H-arms, bulkhead, hub carriers and pivot blocks). A new, black fiberglass rear shock tower is included with the SE, and, like the front tower, it has improved geometry and three upper mounting positions for the shocks.

• **Tranny.** Losi's LRM (Low Rotating Mass) transmission, with its externally adjustable differential and low, 2.18 reduction, set the standard. With the release of several new tranny designs by other manufacturers (most notably Associated's Stealth), it became apparent that, to remain competitive in the ever-increasing battle for 2WD supremacy, Losi needed to develop a torque-limiting device, e.g., slipper clutch, of their own.

Instead of designing a new transmission, Losi refined its

(Continued on page 66)

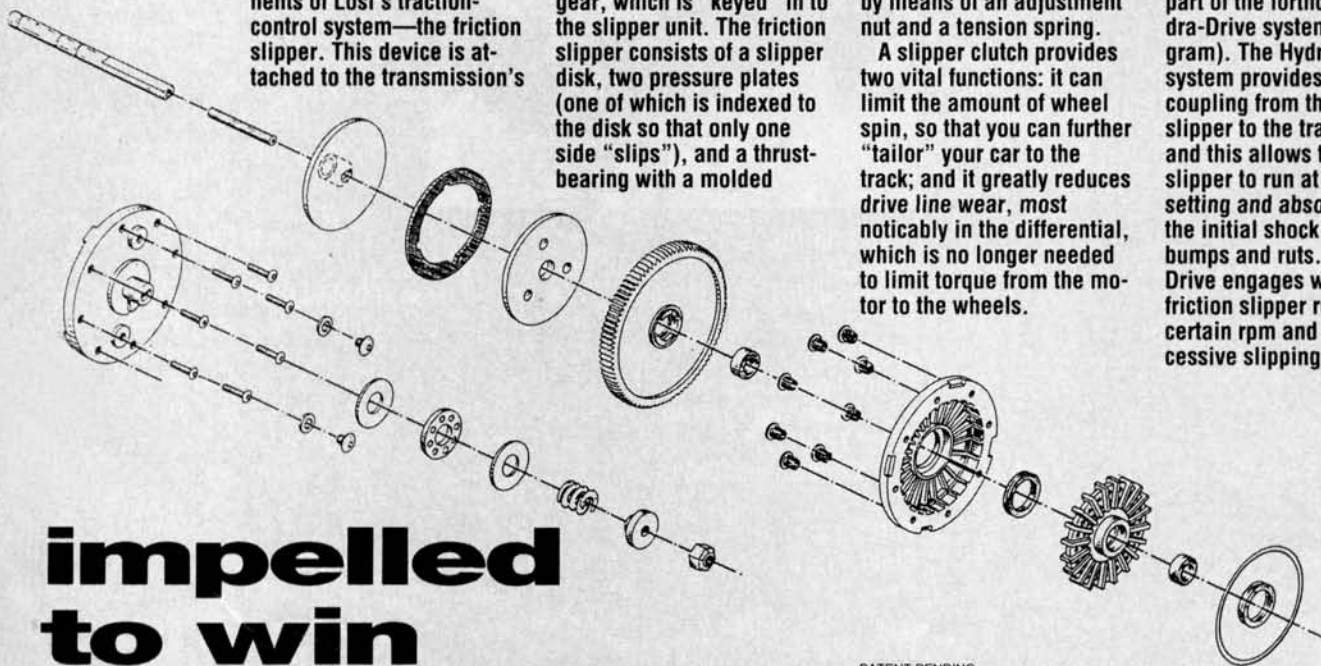
The Losi SE is equipped with one of the two components of Losi's traction-control system—the friction slipper. This device is attached to the transmission's

top gear shaft, and it sandwiches the special spur gear, which is "keyed" in to the slipper unit. The friction slipper consists of a slipper disk, two pressure plates (one of which is indexed to the disk so that only one side "slips"), and a thrust-bearing with a molded

housing. Pressure is applied to the slipper clutch's pad by means of an adjustment nut and a tension spring.

A slipper clutch provides two vital functions: it can limit the amount of wheel spin, so that you can further "tailor" your car to the track; and it greatly reduces drive line wear, most noticeably in the differential, which is no longer needed to limit torque from the motor to the wheels.

Losi's friction slipper was designed to be an integral part of the forthcoming Hydra-Drive system (see diagram). The Hydra-Drive system provides a viscous coupling from the friction slipper to the transmission, and this allows the friction slipper to run at a loose setting and absorb much of the initial shock caused by bumps and ruts. The Hydra-Drive engages when the friction slipper reaches a certain rpm and curbs excessive slipping.



PATENT PENDING

impelled to win

AS SOON AS THE tone signaled the start of the heat, the blue RC10 grabbed the holeshot in the middle row. It "out-horsepowered" the other cars down the straight and pulled away from them out of the corners with a huge lead. In the post-race inspection, it was determined that the car and its motor were legal, but one question remained: what made it so fast? To squeeze out as much horsepower as possible, the driver probably used a motor dyno to determine which brushes and springs to use.

There are several dynos on the market, and most of them offer amp-draw measurement, adjustable voltage and a way to put a load on the test motor. Some even measure torque and power, provide digital displays and have precise, electronically controlled loading. They cost \$300 to \$400, though—more money than most racers have to spend on such equipment. Enter the Thompson Electronics* Motor Master Dyno, which offers many of the features of a high-end dyno in an affordable package.

JUST THE FACTS

The Thompson Dyno is a well-built unit that's housed in a brushed-aluminum case. On its face, there are input, output and load wires, a 10-position load dial and a voltage-adjustment dial. Both the test points for a digital voltmeter (DVM) and the switch that allows you to select voltage, rpm, or amp-draw readings are on the top of the case. To keep the unit cool, it has a terminal on its right side that provides power to the supplied fan, and a large black-anodized heat sink is attached to the back of it.

To complete the dyno package, you need a 12V power supply (a regulated supply, a car battery, or a car-battery charger) that produces a minimum of 20 amps; a slave motor; a coupling to connect the test motor to the slave motor; a DVM; and a dual motor stand.

TAB A INTO SLOT B

All the Dyno's wires have alligator clips on their ends, so it's easy to hook everything up. (Note: I hard-wired the slave

motor; a loose-fitting alligator clip at this connection affects the accuracy of the readings.)

The Thompson Dyno has a large voltage range of 0 to 9 volts, and you control it with the voltage dial. You should test all your motors under identical condi-

tions; the heat sink becomes hot very quickly.) Record these numbers so that you can compare the performances of a variety of motors.

BEHIND THE NUMBERS

What do these numbers mean, and how do they relate to a motor's performance? A motor with more rpm at the first load setting (light load) will have a higher top speed. A motor that has more rpm at the 10th load setting (maximum load) will accelerate very quickly. If you test a motor at 10 different settings, you'll know exactly how it will perform before you ever hit the track.

The amp draw is also an important consideration. A motor with a lot of rpm and a low amp draw is more efficient than one with the same rpm and a high amp draw. (The latter might cause your car to dump.)

To compare the performances of two motors, it's best to chart the results on a sheet of graph paper. Using this information, you can "tune" the motor by deciding which brushes and springs to use.

You can even tailor it to suit track conditions; a slippery track will demand a motor with less torque and smoother power delivery.

IMPROVEMENTS

The Motor Master doesn't have an on/off switch so, during the tests, the motors run continuously, and this causes them to heat up. I opened the case and attached an on/off toggle switch to the power-input line and a momentary push-button switch to the slave-motor line. I cut two holes in the case to accommodate the switches. Now, I can control the power to the Dyno and, to test a motor, I just push the button to start the slave motor, read the results and let go of the but-

ton—no overheating, no headaches!

The Thompson Motor Master is an inexpensive alternative to the high-priced, high-tech motor dynos on the market. It enables you to get the most out of your motors without having to rob a bank!

*Here's the address of the company featured in this article:
AVS Thompson Electronics, 8404 Grand Div.,
Cleveland, OH 44125.

THOMPSON ELECTRONICS

Motor Master Dyno

by ALEX STROUTHOPOULOS

Spin to win

The compact Thompson Motor Master Dyno has many features that are usually found only on the more expensive units.

PHOTO BY YAMIL SUEZ

tions, so it's best to establish standard test voltages. After you've adjusted the dial to provide the appropriate amount of voltage (displayed on the DVM), flip the top switch to the rpm setting, and write down the number that appears. Repeat this procedure to determine the amperage. Switch to the next load setting, and determine the rpm and amperage it produces. (It's best to use the supplied cooling fan during

TOP SECRET
TERROR

Inside

MASAN STEALT

by FRANK MASI



PHOTOS BY YAMIL SUEDE

MASAMI'S H CAR

'89

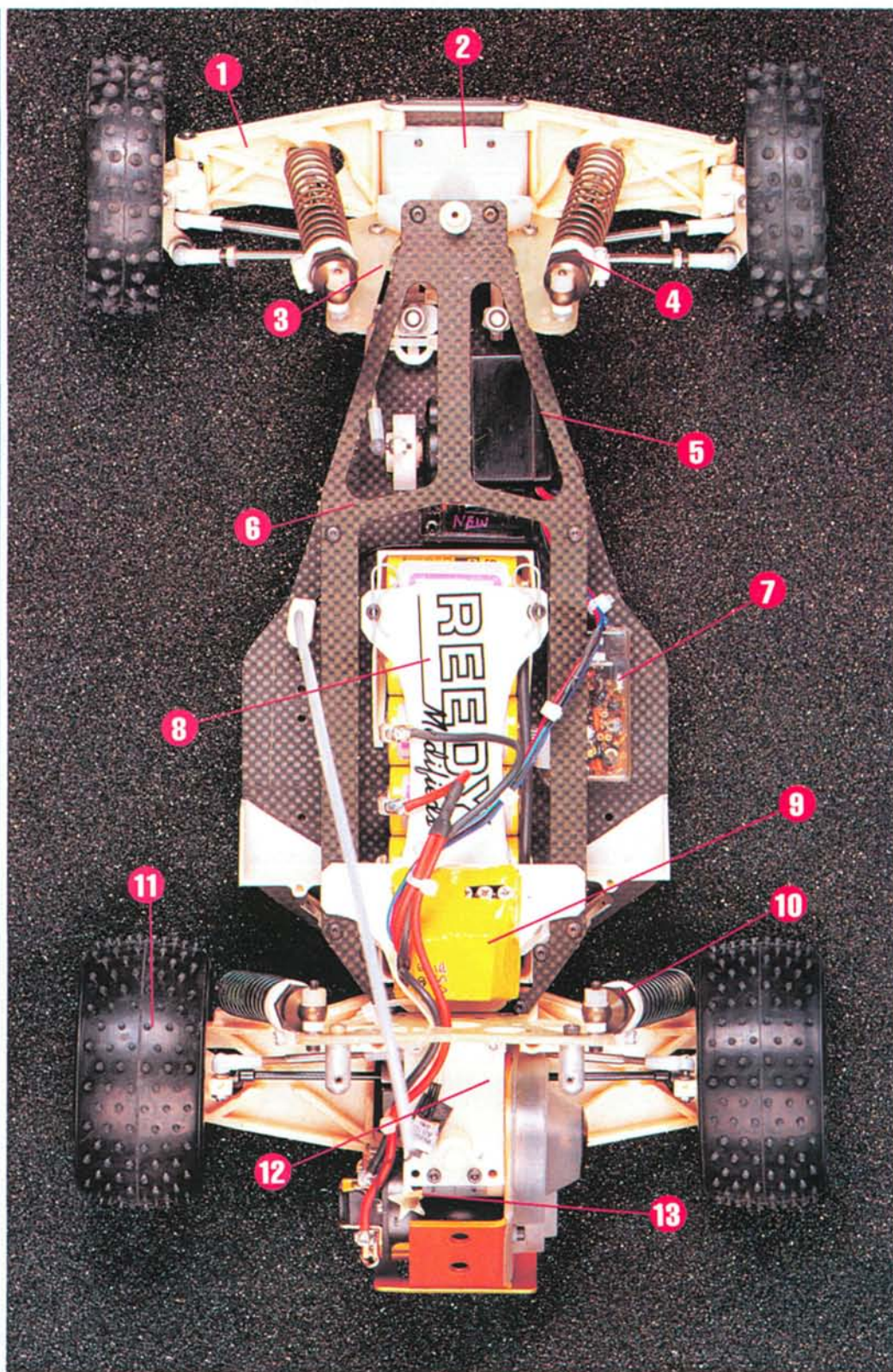
WHEN MASAMI Hirosaka won the 2WD and 4WD classes at the '89 IFMAR world championships in Australia, we were the first to give you an inside look at his winning Yokomo Super Dog Fighter 4WD car...but what about his 2WD car—the Associated* prototype “stealth” car? No one outside Associated has ever seen this car without its body. In fact, when a photographer

tried to sneak a picture of it in Australia, Associated demanded that he turn the film over!

Why all the commotion? Manufacturers of R/C cars have corporate secrets, just like makers of full-size autos. It takes enormous sums of money and countless hours of R&D to develop a successful car design. Associated had come up with an original prototype car, and it didn't want other companies to benefit from its work before the car reached the production stage.



1. Handmade, extra-long suspension arms
2. Hand-machined narrow front bulkhead
3. Scratch-built fiberglass shock tower
4. Hard-anodized Associated 1.02-inch shocks
5. KO Propo PS-87 Limited Edition FET servo
6. Upper chassis plate (graphite)
7. KO Propo receiver with lightweight Lexan case
8. 6 Reedy matched 1700mAh Sanyo SCE cells
9. KO Propo ESC, shrink-wrapped with case removed
10. Hard-anodized Associated 1.32-inch shocks
11. Yokomo 2.2-inch rims with TR-31 tires
12. Hand-machined transmission (2:1 reduction)
13. Reedy Modified's Gold Star motor



It has been more than two years since the Australian Worlds. Masami is no longer both 2WD and 4WD world champion, having lost his 4WD crown to Associated teammate Cliff Lett at the '91 Worlds. Even the car that Masami used to retain his 2WD title is different from his '89 car.

When Gene Hustings of Associated of-

fered to send us Masami's winning '89 car, we thought our readers would still be interested in a close-up look at perhaps the most famous R/C car there has ever been—the original “stealth” car.

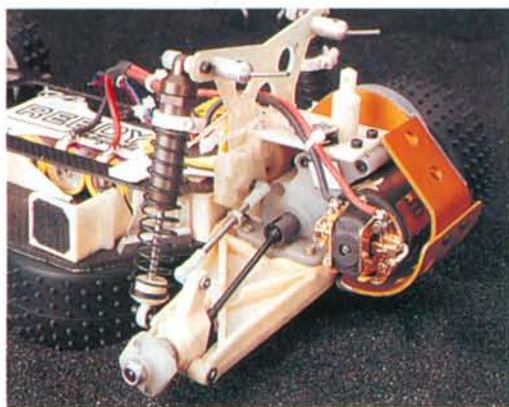
ONE-OFF WORLDS WINNER

The Associated prototype car, dubbed the “stealth” by *Car Action*, is almost com-

pletely different from the RC10. The prototype uses only the RC10's caster blocks, steering arms and axles up front, and its shock tower, bulkhead, drive shafts and hubs in the rear. Every other component on it was *handmade*!

DOUBLE-DECKER

The car has a double-deck graphite chas-



The transmission developed for Masami's car is the fore-runner of Associated's Stealth tranny. It was completely hand-machined—even the gears. The prototype's gear reduction is 2:1, compared with the Stealth's 2:25.

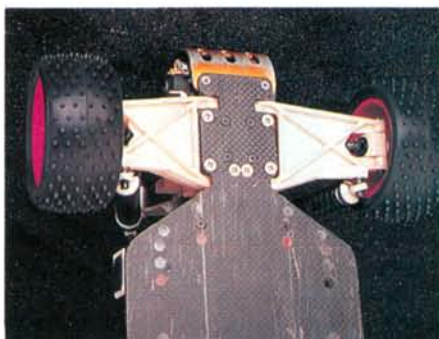
sis. The lower part of the chassis is similar to that of the graphite RC10, but there are some pronounced differences. First, the nose of the chassis is only about half as wide as that of the RC10—a main reason for the upper plate. Such a narrow front requires substantial bracing to prevent unwanted flexing and breakage. Toward the middle, the lower chassis is significantly wider. This is to allow for side-to-side battery placement. Arranging the cells this way makes the steering response slow, and the front-to-rear rotational response (e.g., weight transfer) quick. Generally, though, it's more desirable to position the cells from front to rear; this avoids the aforementioned characteristics, and makes the steering response quick and the front-to-rear weight transfer slow. Because the upper chassis plate is connected to the front and rear bulkheads, and because there are aluminum posts that strategically connect it to the lower chassis plates, it reinforces the front of the lower chassis and increases the car's resistance to side-to-side flexing.

GO WIDE, YOUNG MAN!

For the prototype, Roger Curtis, Cliff Lett and Curtis Husting set out to design a front end that would have several advan-

tages over the conventional RC10 front end. First, they determined that the suspension arms should be longer than those on the RC10. Longer A-arms reduce tire scrub (unwanted lateral movement of the tire) because, in comparison with shorter arms, they move through a shorter arc for a given amount of suspension travel. The car's track couldn't be widened and still be race-legal, so the logical solution was to move the arm's inner pivot points inward. The result was the now-popular narrow bulkhead.

The car's suspension arms are attached to a nylon, one-piece, hand-machined front bulkhead. The arms are also made of nylon, and they're substantially wider than anything that was available in '89. Attached to the outer ends of the front



For this car to use longer rear arms and still be a legal width, the arm's inboard hinge pins were re-located toward the center of the car. The rear of the chassis has been slotted to let the arms achieve full travel.

A-arms are conventional RC10 20-degree caster blocks and in-line steering blocks and axles.

With the creation of new front-suspension geometry came a new problem—shock location. To work effectively, the prototype's suspension leverage had to be kept more or less the same as that of the



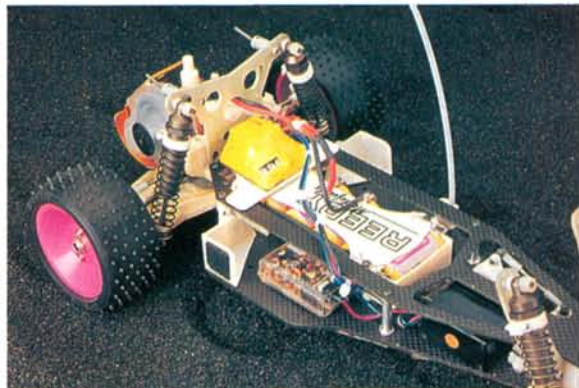
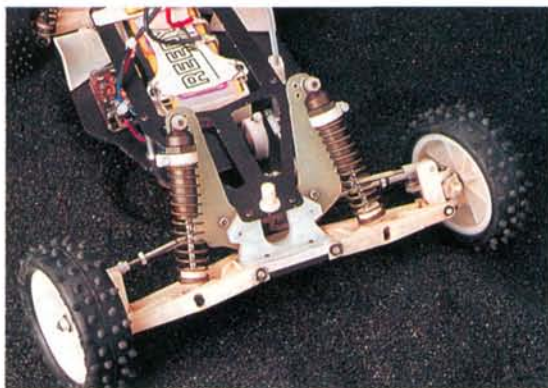
CONTROVERSIAL TIRES

The biggest controversy at the '89 Worlds involved the 2.2-inch wheels and tires used by Associated and Yokomo. These larger-than-usual wheels, combined with Yokomo's TR-31 tires, were unbeatable on the slick, hard, Australian track. Unfortunately, these rims and tires were only available to Yokomo and Associated team drivers, and the "have-nots" cried foul. Nevertheless, under IFMAR rules, the TR-31s were legal. Masami mounted these rims and tires on his "stealth" car using Yokomo's adapters.

RC10. The solution required that the car have long front shocks to go with the long front arms. Associated's 1.02-inch shocks fit the bill perfectly. The prototype's original front shock tower angled the shocks inward, making damping slightly progressive. When the team arrived at the Australian track and began to test the cars, they found that the cars worked better with very little suspension progression on the front shocks—if any. With some

Right: the front end of Masami's "stealth" car is radically different from that of previous Associated designs. In addition to its hand-made, extra-long arms, it has a narrow bulkhead that's attached to the upper chassis plate for reinforcement.

Far right: the car's foundation is its double-decker graphite chassis. The upper plate ties the front and rear suspensions together for strength and resistance to side-to-side flexing.



M A S A M I ' S STEALTH CAR

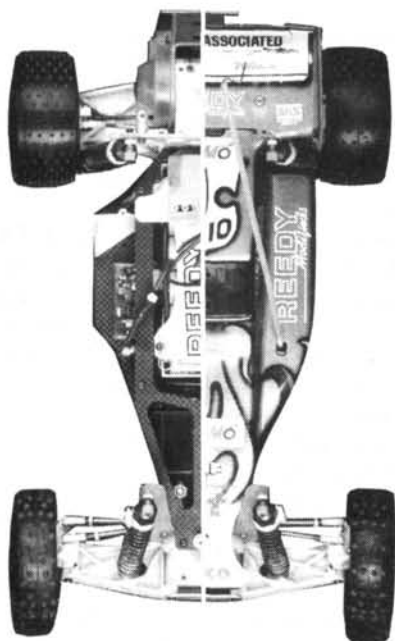
fiberglass stock and a Dremel tool, Curtis Husting went about hand-making new front shock towers.

THE ORIGINAL STEALTH TRANNY

The '89 IFMAR Worlds was the second event at which Team Associated competed with their prototype gearbox (the first was the '89 ROAR Nats in Detroit). Although similar in size and shape to today's Stealth tranny, the one on Masami's car was special: every component, from the gears to the cases, was made by hand. Beside this, there are two major differences between the prototype and production Stealth gearboxes; the prototype had a lower 2:1 gear reduction (compared with the Stealth's 2.25:1); and Belleville (concave) washers were used in the prototype's differential—not the production Stealth's thrust-bearing spring.

REAR SUSPENSION

Like the front suspension, the rear suspension was made using state-of-the-art design techniques. To begin with, the rear A-arm mounts are reversals of the RC10 parts. The inner hinge-pins are toward the inside of the car, next to the transmission. This allows the use of longer A-arms. The nylon arms on Masami's car provide the same benefits that the long front arms do (i.e. less wheel scrub and increased stability on rough tracks), but they also reduce drive-shaft scrub, i.e., they allow the rear suspension to move more freely than shorter arms would, because the shafts don't slide as much in their outdrives per given amount of suspension travel. In addition, material has been removed from the rear of the main graphite chassis to make clearance for the long arms and to allow them a full range of travel. The rear damping was provided by hard-anodized, aluminum-bodied 1.32-inch shocks.



ADDITIONAL EQUIPMENT

Masami's winning car had several other interesting pieces of hardware. For steering, it used a KO Propo* PS-87 Limited Edition FET servo with an in-line booster. Although it was concealed in a layer of shrink-wrap (to save weight, no doubt), I'm pretty sure that Masami used a KO Propo CX-III electronic speed controller. The standard KO receiver (to go with Masami's trademark KO stick transmitter) was encased in a Lexan cover—also, to save precious ounces.

Rounding out this impressive list of equipment is a full set of Lunsford Racing's* titanium alloy turn-buckle tie-rods and a Reedy Modified's* Gold Star modified motor. To top off his car, Masami had an Associated body that was painted

his trademark metallic green with custom flames.

Now that you've seen the '89 "stealth" car up close and personal, I bet that many of you would like to see the new Stealth car (the '91 World Champion) in the same way. From what I know, Associated has made significant changes to its prototype since the '89 Worlds—changes that have altered not only the car's appearance, but also its handling characteristics. The new car could be on the shelves as early as this summer. We'll keep you updated.

Thanks to Gene Husting and Associated for allowing us to take such an in-depth look at the first "stealth" car.

**Here are the addresses of the companies mentioned in this article:*

Associated Electrics, 3585 Cadillac Ave., Costa Mesa, CA 92626.

KO Propo; distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.

Lunsford Racing, 619 First Ave. E., Albany, OR 97321.

Reedy Modified, 3585 Cadillac Ave., Costa Mesa, CA 92626. ■

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SCOPING OUT

by JOHN RIST

Tekin 408S



HIGH-FREQUENCY electronic speed controllers (ESCs) have burst onto the racing scene with a vengeance. They provide longer run times, longer brush/commutator life, cooler-running motors, and, above all, very smooth throttle response. This smooth throttle response is especially apparent at the intermediate to slow speeds that are typical of tight roadcourses.

The problem with these "miracles" is that, as the newest, hot, trick racing items, they tend to be expensive, but Tekin seems to have come to the rescue of budget-minded racers who are looking for true high-frequency (HF) ESC performance. Tekin claims its newest sport-model ESC—the 408S—is *truly* high frequency. I tested it to see whether it has some hidden capabilities—ones greater than its "sport" designation implies.

I removed the 408S from its case and saw that, as with all Tekin ESCs, it contains a raft of high-tech electronic wizardry. The pc board is a double-sided, plated, through-hole affair that takes a multitude of surface-mounted parts that lie flat on the board instead of

both sides of the board. By combining surface-mounted and conventional parts, Tekin has achieved smallness and low "on" resistance. It's a sport-style ESC with the construction of a thoroughbred racing controller.

The 408S has these features:

- 6 FETs (5 for forward; 1 for brake);
- 4- to 8-cell capacity;
- BEC;
- high-frequency motor control;
- built-in 50A fuse to protect the controller from being damaged if the battery is connected backwards;
- built-in pulse checker;
- factory-installed motor and battery connectors.

It comes with a full-color instruction book, a heat-sink set, a screwdriver, hole plugs, mounting tape, receiver-connector conversion plastics, motor caps and wire tie-wraps.

The 408S is a racing-style ESC without reverse. The factory-installed Tamiya-style battery and motor connectors aren't satisfactory for racing, however. It has high-frequency motor control, which prolongs armature life, increases run times and, above all, offers incredibly smooth

going through it. The parts are mounted on both sides of the board, and this helps to minimize the size of the controller. On the other hand, the current-handling FETs are conventional components with the leads passing through the pc board to allow them to be connected to the wide etch on

throttle response, especially at the lower speeds.

All this looks quite impressive for a sport-style ESC, but let's head to the "Scoping Out" Lab to check the 408S's performance.

RESISTANCE TEST

First, I run the "on" resistance test, because "on" resistance is an ESC's most important property. I run the test twice: first, along the full length of the motor wires and battery wires (including connectors); second, 2 inches along them. The first test reveals the total "on" resis-

(Continued on page 46)

• THE SCOPING OUT LAB •

John Rist's lab consists of:

- an oscilloscope
- a digital voltmeter
- a resistor load bank
- a 6V 30A electricity supply
- a Pit Stop Radio servo/speed controller tester.

The oscilloscope is used to monitor the controller's output and to guarantee that it's fully on.

The digital voltmeter takes all the voltage-drop readings and verifies the reading on the current meter.

The resistor load bank consists of 40, 12-ohm, 5W power resistors, which can be switched on and off one at a time to vary the load between .6 amp and 20 amps, but the standard 12 amps are usually used.

In series with the resistors is a 25A Simpson current meter and a 1-percent .01-ohm resistor. By measuring the voltage drop across this resistor, the current-meter's reading can be double-checked. Of course, the lab power supply provides the test current.

SCOPING OUT

(Continued from page 44)

TEKIN 408S

DIMENSIONS:

Height	0.75 inch
Width	1.6 inches
Length	1.4 inches
Weight with wires	1.8 ounces

TUNING:

Access to controls	Good
Ease of adjustment	Fair

PRICE:

Suggested retail	\$102
Warranty	120 days

ELECTRICAL:

(Manufacturer's specs)

Max. voltage	10 volts (8 cells)
Min. voltage	5 volts (4 cells)
Max. current	1,050 amps
Continuous current	250 amps
Resistance	0.004 ohm

TEST PARAMETERS:

Voltage	6 volts
Current	12 amps
Voltage drop full length of wires	0.26 volt
Voltage drop, 2 inches along wires	0.09 volt
Calculated resistance:	
Resistance to end of wires	0.021 ohm
Resistance, 2 inches along wires	0.0075 ohm
BEC voltage, 6-cell pack	5.10 volts
voltage drop/current = resistance	

COMMENTS:

The Tekin 408S is designated a "sport" ESC, and is probably the least expensive, high-frequency, motor-drive speed controller on the market. It has enough muscle for racing, especially in the stock or sportsman classes. It gives smooth throttle response (especially at lower speeds) and longer run times, and your brushes and commutator will last longer. A major shortcoming is the Tamiya-style battery and motor connectors. They're fine if you run the controller in an entry-level car (run times in the 8- to 12-minute range), but if you race and have set your gearing for a 4-minute dump, replace the connectors with good, low-loss connectors or hard-wire the battery and motor. If you're on a tight budget and want a step up in performance from a mechanical or reversing SC, the 408S should suit you.

tance of the controller as it comes from the factory, and the second test gives a standard measurement with which controllers can be compared.

To determine resistance, I measure the voltage drop across the controller with 12 amps of current flowing, and then I calculate the "on" resistance by using the formula: voltage drop divided by 12 (amps) equals "on" resistance ($V/I=R$).

With 12 amps of current flowing, I measured a 0.26V drop between the battery connector and the motor connector—a resistance of 0.021 ohm. With the 12 amps still flowing, 2 inches along the wire, I measured a 0.09V drop—an "on" resistance of 0.0075 ohm. These figures aren't in the same class as those I obtained with the 408S's big brother, the 420F, which came in at an amazing 0.0033 ohm, but it's low enough to indicate that the 408S should perform well in most applications. Don't forget that this is a *true* HF motor-drive controller, but it costs about *half* of what its big brother costs.

It's worth noting that the resistance reading taken along the full length of the wires (including connectors) is close to three times higher than the resistance reading taken 2 inches along the wire (0.021 ohm versus 0.0075 ohm). This tells me two things: the Tamiya-style connectors are almost useless, and this ESC has excessively long motor and battery wires. If you want to use the 408S for racing, you can improve its "on" resistance by two-thirds, simply by using better connectors and making the motor and battery wires as short as possible.

LET-IT-COOK TEST

For this test, I jack the current up to 20 amps and let the controller take it for 15 minutes. I run the controller with the heat sink in place, but I don't provide any air cooling (no fan). I use the heat sinks (and it's always important to use a heat sink) because I'm not exactly sure where the heat sensor that trips the thermal shutdown is. With the heat sink, any heat that's generated will be spread evenly among the FETs. This way, no matter where the heat sensor is, it will sense the heat and do its job.

After 15 minutes, the 408S's heat sinks were hot enough to hurt if you tried to

touch them, but the controller didn't get hot enough to go into automatic shutdown; in fact, it operated normally throughout the test.

DEAD-SHORT TEST

Let's see whether this ESC can take abuse. To simulate a stuck motor, I put a dead short across the motor leads and let the controller pump current for a minute. With the short in place, the current jumped to 40 amps (the limit of my lab supply), and after 1 minute, the 408S was hot enough to burn my finger, but the Tamiya-style battery connector was *really* hot. In fact it was starting to smoke and was getting soft. You'll find these connectors in hundreds of cars, and they'll obviously get the battery juice to the motor, but they rob it of gobs of power. If your best buddy starts waxing you, check to see whether he has installed a secret weapon such as Litespeed* connectors.

When the smoke had cleared and I had removed the short, I found that the 408S was operating normally. You can destroy anything if you try hard enough, but I think that the 408S is strong enough to survive most problems—even serious ones. Remember, if your car slows, shut it down and find out whether your motor is hot enough to burn you. If it is, you don't have to be a rocket scientist to realize that it's time quit and fix.

REVERSE-VOLTAGE PROTECTION

The 408S has Tekin's wonderful reverse-battery-voltage protection circuit, so I gritted my teeth and plugged the 408S up backwards. The 50A fuse let go with a snap, and the ESC seemed to stop drawing current. I reconnected the battery properly (fuse still blown) and found that the controller was working, but at full throttle, its performance was erratic.

I replaced the fuse, and the 408S's performance was restored to normal. *Caution:* the Tekin fuse is special. I recommend that you keep a spare one in your toolbox. It would be a disaster to pop a fuse on race day and then be unable to find a replacement.

FUN TIME!

In the lab, the 408S seemed to be tough, but it was time to test it in a car. For tests, I like to use one of my favorite R/C cars—my Kyosho Sideways with Miss

(Continued on page 90)

TROUBLESHOOTING

by FRANK MASI

Illustrations by GERRY YARRISH

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897.



YEARNING TO TURN

Maybe you can help me. Recently, I converted my RC10 into a monster truck, and I'm having some steering problems. It doesn't seem to corner quite as well, especially when turning left. I don't know what to change.

Robert F. Nowak
Renton, WA

Your problem is fairly common. Most people who convert off-road buggies into monster trucks don't consider the effect that larger tires will have on their steering servos. Generally, you'll need a servo with at least 40 ounce/inches of torque; I guess that yours doesn't have enough torque. Futaba's S9101 and S9301, Airtronics' 94738 and 94141 and JR-Propo's 517 and 3021 servos all have enough torque and are available for less than \$80. If this is out of your budget, you can try to alter the mounting position of your steering linkage to give your servo more leverage on the wheels. To do this, attach the linkage to the outermost hole on the servo-saver and/or the outermost hole on the steering bellcranks.

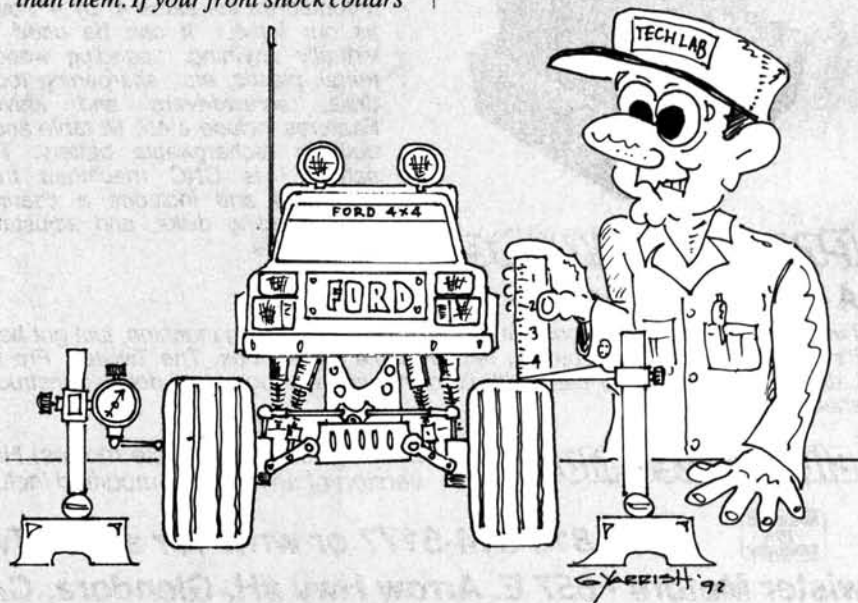
HAZARDOUS HANDLING

About eight weeks ago, I started R/C car racing and, after careful consideration, I bought an RC10T. In the past few weeks I've improved tremendously (I finished fourth in the A-Main in my most recent race), but I need to know the best way to eliminate push. I run 40WT pure silicone in the rear (with gold springs) and 30WT pure silicone in the front (with silver springs). The shock collars are set at $\frac{1}{2}$ inch (front) and $\frac{3}{16}$ inch (rear), and I've been told that I have a smooth trigger finger. I run stock front tires on a medium-grip clay track.

Jeff Retez
Gainesville, FL

You can do several things to eliminate push. First, check ride height. With all the running gear, i.e., batteries, radio gear and motor, in place, drop the truck from a height of about 6 inches. When the truck comes to rest, the rear arms should be at the same height from the ground, and the front arms should be slightly higher than them. If your front shock collars

are $\frac{1}{2}$ inch lower than the tops of the shocks, you may have to raise them to achieve the proper ride height. If the ride height is fine, you should try adding 1 to 2 degrees of toe-out to the front wheels. This will make the truck turn a little more aggressively. You could also increase the rear ride height slightly. This will help to transfer more weight to the front tires when the truck decelerates. If your truck has plenty of rear traction, you can improve its steering by using rear tires with a little less bite. This will allow the truck's rear to drift (slide out) slightly when you enter a turn. You can also help rear-end drift by trimming or removing the outermost row of spikes on your rear tires. Cliff Lett recommends the use of 40WT oil on all four corners with the kit's gold springs; you might want to try this, too. It works well for me on most tracks. Remember, make one change at a time. It's the only way to gauge the effectiveness of each change.

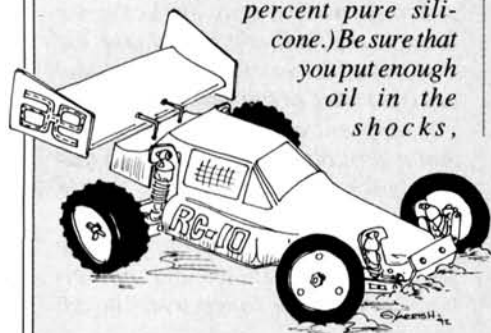


COMPRESSION DEPRESSION

I recently bought an RC10, and every time I push its front shocks down they only come halfway back up. What's the problem? I use the stock springs (gold on the front and silver on the back).

**Jason Seal
Elkhart, IN**

Make sure you have the correct shock oil. For the RC10, 20WT to 30WT oil almost always works very well in the front shocks, and 30WT is an ideal starting point for the rear shocks. (Any type of oil will do; in colder climates, use Associated's 100-percent pure silicone.) Be sure that you put enough oil in the shocks,



but don't overfill them, because that could create "hydraulic lock," which will prevent the shock shaft from fully entering the shock body. When the shocks are properly filled, the shock shaft (without the spring) should rebound (come back out after being pushed into the body) about 1/4 inch. When you're sure that you've filled the shocks correctly, put the springs, the shock collars and the spring retainers on them and install the shocks in the car. With all running gear, i.e., batteries, radio gear and motor, in place, drop the car from a height of about 6 inches. When the car comes to rest, its rear arms should both be at about the same height, and the front arms should be slightly higher than them. If your chassis is lower than this, gradually lower the spring-adjusting collars until the proper ride height is attained. If the chassis is higher than it should be, raise the collars. Proper ride height is crucial because it greatly affects your car's handling.

SPUR OF THE MOMENT

I enjoy reading your magazine very much, especially the articles on modified 4WD cars, like the YZ-10 in your July '91 issue. I own a modified Kyosho Lazer ZX. The only problem I have is with my drive gears—spur and pinion. I don't like to use the original Kyosho pinions and spurs because they're so noisy and they don't last long. Recently, I purchased a Kimbrough spur gear and a Yokomo pinion. My hobby shop said that I should lower the pinion to 16 or 17 teeth. I tried that, but the pinion didn't reach the spur gear. Should I use the new Robinson Racing Lazer gear set? I use a 14-turn, double-wind Reedy Mr. L motor and a Novak 410-MXC speed controller. What's a good number of teeth for 48-pitch spur and pinion gears that are suitable for my car?

**Andrew Gotianse
Metro Manila,
Phillipines**



Although I've never had any problems with the stock, molded, metric 48-pitch spur gear that's standard on the Lazer, it can sometimes be difficult to find metric pinions to use with it. Kyosho and Robinson Racing Products make complete lines of metric 48-pitch pinion gears. Robinson Racing Products also makes machined-nylon spur gears for the Kyosho Lazer in 96-, 100-, 108- and 115-tooth sizes (the last two are intended for truck conversions). A 100-tooth (standard teeth) spur gear will work well in just about any situation. Assuming that you use 6-cell 1700mAh SCEs and a 100-tooth spur gear, begin with a 19-tooth pinion and work your way up or down from there, depending on track conditions and your driving style. For 1400mAh SCR or 7-cell SCEs, begin with at least a 17-tooth pinion.

COMING NEXT MONTH!

RC10 ISSUE

**READERS' RIDES
TRACKS
CARS
PIT TIPS
ACCESSORIES
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R/C RACER

**Cleveland Indoor Champs
Inside the Winning Car
Make an External
Battery Pack**

TRACK REPORTS

**C&M Cobra SS
Schumacher Cougar II
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COLUMNS

**Nitro News
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TROUBLESHOOTING

DOUBLE CLUTCHING

I'm relatively new to R/C. I own an RC10 with a Novak ESC and run a Tony Neisinger motor. When I bury the throttle off the starting line, I hear a whirring sound, kind of like a diff slipping. It takes 20 seconds to get to top speed, but it isn't over-gearred. Is my diff too loose? If it is, how can I tighten it? If it makes a difference, there's a slipper clutch on it. Thanks, and keep up the great mag.

Ronnie Adams
Hollywood, FL

If you're using a slipper clutch on any type of gear-reduction transmission (such as the RC10's), the differential should be adjusted in the following way: first, lock the slipper clutch so that it absolutely won't slip. Then tighten the differential a little at a time until it's very difficult to make it slip with your hands. Now, gradually loosen the slipper clutch until it slips

fairly easily when you hold both wheels and rotate the spur gear. The best place to make the final adjustment is at the track. Put the car on the ground, and make a series of full-throttle takeoffs. For slippery tracks, set your slipper so that it slips about 1 foot from a standing start. For high-bite tracks, tighten it slightly. A slipper clutch that's adjusted correctly will help to preserve your initial diff settings and substantially increase the longevity of the diff components.

BINDING BEARINGS

I have a factory-built Traxxas Sledgehammer. I haven't made any modifications to it yet, but I have a question. A while ago, my truck threw part of its drive shaft. Since then, when I hit my throttle and let go, the truck swerves left. I adjusted the trim, but it didn't help. When I pick up the back end, hit the throttle and let go, the left rear wheel stops first. What's my problem, and how do I solve it?

Matt Gave, Sterling Heights, MI

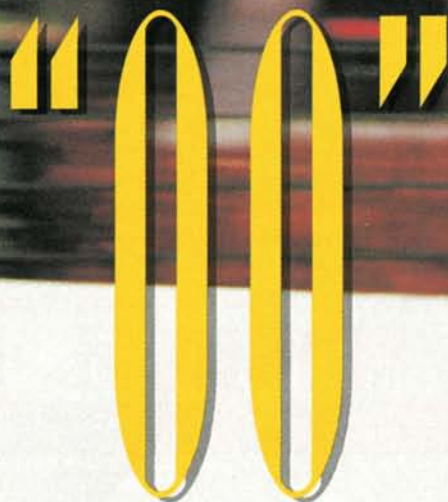
It sounds as if at least one of the transmission's left-side outdrive bushings or one of the rear axle bushings is binding. To remedy this, remove the hinge pin that secures the left rear wheel hub to the A-arm, and pull the wheel hub far enough away from the tranny to separate the drive-shaft halves. Spin the tire. If it rotates easily, the problem lies in the tranny's outdrive bushing. If it doesn't spin freely, remove the wheel, the retaining pin and the axle itself. Wipe the axle and the insides of the bushings with a rag soaked with motor spray. Put a few drops of oil on the bushings and give it time to be absorbed. Reassemble the axle and spin the tire again. It should rotate freely.

If the problem is in the tranny's outdrive bushing, disassemble the tranny and repeat the procedure just described. If cleaning the bushings doesn't solve the problem, you can buy replacements from Traxxas, or you can upgrade your Sledgehammer with ball bearings (their low-friction operation will improve both performance and reliability).





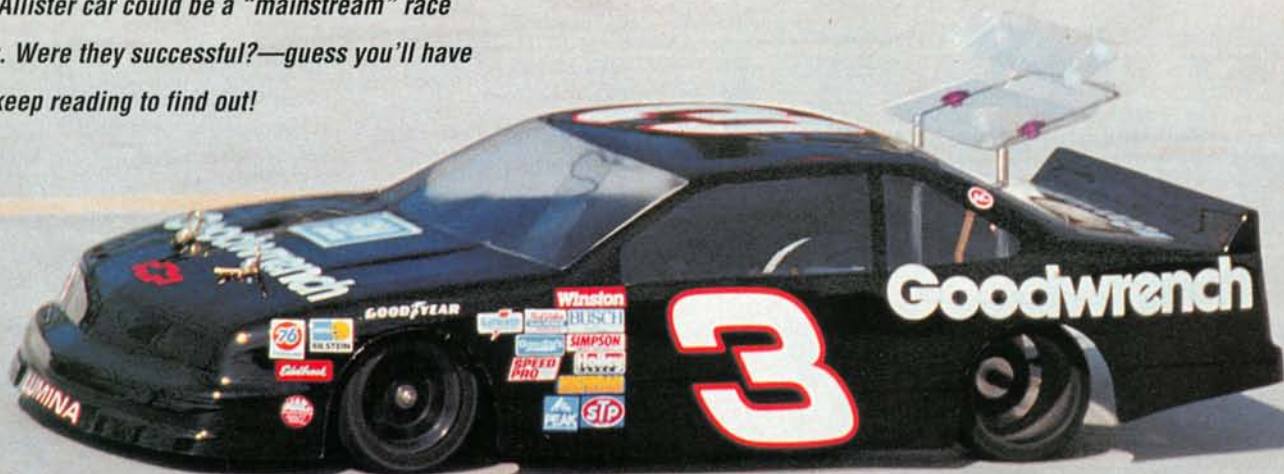
McAllister



ACCORDING TO the dictionary, an "anomaly" is something that deviates from a general rule. I'd like to add something to the definition of "anomaly": something that deviates from a general rule; see the McAllister* Oval Only.

The McAllister Oval Only is Gary McAllister's newest entry into the LTO (left turn only) 1/10-scale car market. McAllister and Dave Pulfer (who did a lot of developmental work on the Oval Only) set out to show the R/C world that a McAllister car could be a "mainstream" race car. Were they successful?—guess you'll have to keep reading to find out!

by LARRY COLE



A couple of years ago, Bolink was the first company to offer an LTO car. Since then, many other companies have released their versions of this chassis. With this type of car, all the batteries are stacked on the left side to allow faster cornering speeds on oval tracks.



After I received the Double-"O," I examined the instruction sheet to see how much trouble I was in for. Surprise! This car doesn't come with a typical step-by-step instruction sheet. Instead, it has an exploded view of the car that illustrates which part goes where. How to build it is up to you. Start with the front, rear—whatever. It makes no difference here. Scrutiny of the kit led me to think that this car was an anomaly. On one hand, the kit came with a one-piece rear pod that many other companies sell as an option; on the other hand, it had a shock that looks as if it belongs on my son's Micro Machine. Then I saw a pro diff and a complete set of bearings, but I noticed that there was no place for rear body-post mounts. Anomaly, indeed!

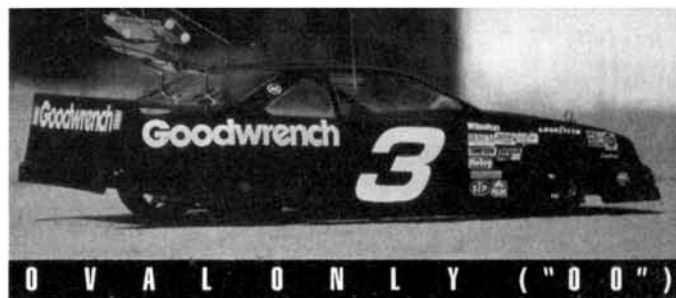
PUT IT TOGETHER

The assembly proved to be a piece of cake, with one exception: I had to use a tape measure to line up the one-piece, straight-axle front end—a time-consuming an annoying process. Finding the axle's center was no problem; trying to keep it perfectly centered in the front block required some patience (something that I lack at times). After I had completed the assembly, I examined my newest creation.

Anomaly 1: The car's one-piece rear pod provides better axle alignment. It's a great heat sink, but it has no axle-height adjusters.

Anomaly 2: Aluminum body posts were used for the front end but nothing was provided for the rear (more on this later).

Anomaly 3: Two different "tweak" screws were used on the rear T-plate, yet there was



"I KNEW RIGHT AWAY THAT THIS CAR WOULD HANDLE WELL. AFTER A COUPLE OF SLOW LAPS, I OPENED THIS BABY ALL THE WAY UP. WHEN I DID, I ALMOST FELL OFF THE DRIVERS' STAND..."

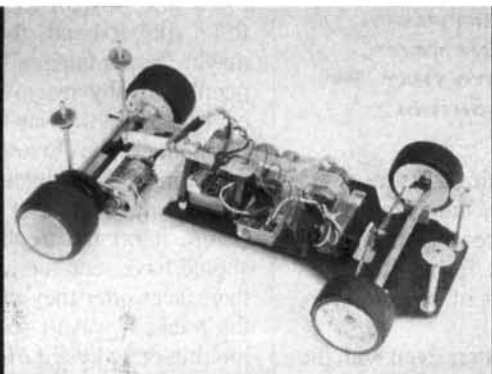
a shock (noted earlier) that looked out of place.

At this point, I was rather skeptical about what was going to happen when this car hit the track.

As I prepared to install the electronics, Pulfer's design work came to light. Besides being McAllister's collaborator on this car, Pulfer is one of the team drivers. He knows

how to build a competitive race car. It's apparent that he doesn't trust screws any more than I do, and he also subscribes to the theory that strapping tape is a racer's best friend!

How do you mount the steering servo?—with two-sided tape and strapping tape! Battery mounting?—use strapping tape again! The



Manufacturer McAllister
Type On-road
Scale 1/10
Price \$249.95

DIMENSIONS:
Overall Length 14.25 inches
Width 8.75 inches
Wheelbase 10.25 inches
Front Track 8 inches
Rear Track 8.75 inches

WEIGHT:
Gross (with battery) 2 pounds, 10 ounces

BODY:
Type McAllister Lumina*
Material Polycarbonate

S P E C I F I C A T I O N S

CHASSIS:
Type Pan
Material Graphite

DRIVE TRAIN:
Primary Pinion/spur
Transmission Direct drive
Differential Ball
Bearings/Bushings Ball bearings

SUSPENSION:
Front: Type Kingpin
Damping Coil spring
Rear: Type T-plate
Damping Shock

WHEELS:
Front: Type One-piece*
Dimensions (DxW) 2x.5 inches
Rear: Type One-piece*
Dimensions (DxW) 2x2 inches

TIRES:
Front Blue foam*
Rear Green foam*

ELECTRICS:
Motor Not included
Battery 6-cell pack*
Speed Controller Not included

OPTIONS AS TESTED:
B&R Bullet; Max-Cell SCR; TRC foam tires; Novak T-4 and NER-2X receiver; Futaba Magnum Jr. and 148 servo.

COMMENTS:
McAllister has thrown its hat into the racing ring in a big way. This is no parking-lot basher; it's a full-fledged race car. Its somewhat awkward appearance isn't an indication of this car's ability to get around a track. McAllister's problem might be that some people won't think that this simple design will work, and they won't give it a fair shot.

***not included**

"OO"

chassis actually has cutouts in it for the strapping tape! Pulfer is a man after my own heart!

I installed Novak's* dependable T-4 and microreceiver. I also thought that this radio setup suited the car's simple look. I installed a B&R* Bullet because I knew that it would give me gobs of speed, and I didn't want to overload the car with a modified on its first time out. I had my suspicions. For the juice, I strapped in a set of Max Cell* conditioned 1400 SCRs.

Now it was time for the fun—the body. I wanted this car to be an all-McAllister creation, so I chose the McAllister Chevy Lumina. With a set of Autographics* decal sheets and some black paint, I made a Goodwrench clone.

As I noted before, there are no rear body mounts on this beast. I looked high and low throughout the box and reread the instruction sheet, but to no avail. All there was in the rear of this car were two wing tubes. There was no way to mount a body. A quick trip back to the instruction sheet

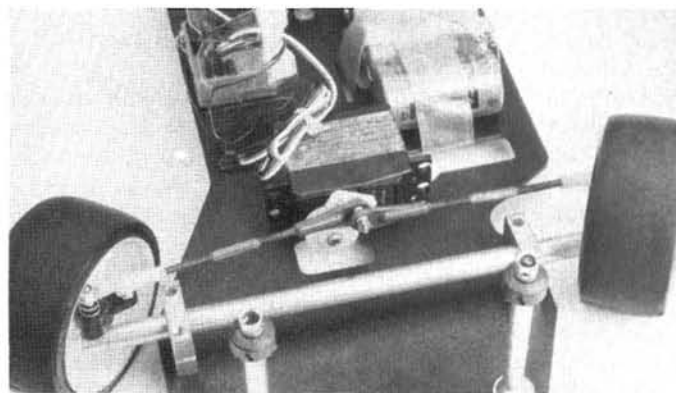
a...ah...emmm...er...a rubber band to hold the body down. OK, OK. I know: they're kidding—right? Wrong. That's *exactly* how you hold the body down. And once you see how the pod and the body work together, you see why this setup is used.

With a little trepidation, I took the car to Hobby World Raceway in Connecticut to give it its first workout. Hobby World has a beautiful, high-banked, tear-shaped, tri-oval. It's a great place to test a car's ability to handle high speeds, and a tight, almost hairpin turn. With all the caution that suspicion brings, I placed the car on the track, and carefully squeezed the trigger.

At this point, I'd like to apologize sincerely to Gary

"I WATCHED IT GLIDE THROUGH THAT NASTY HAIRPIN TURN...IT WAS GLUED! I HAVE NEVER, EVER, TAKEN A CAR THAT LOW INTO THAT CORNER WITH SUCH SPEED AND CONTROL."

McAllister and company. My suspicions were totally unfounded. I knew right away that this car would handle



The car's steering servo is held to the chassis with foam tape and strapping tape—much stronger than foam tape alone.

was *glued*! I have never, ever, taken a car that low into that corner with such speed and control. I was amazed!

Could this car handle a modified motor? Out came the B&R stock, and in went a Twister* 12-turn, triple-wind and a set of Trinity* pushed SCEs. Back to the track I went. Oops! I forgot to

nitely not a "parking-lot basher." It belongs in the on-road racing fray. It is, however, still an anomaly to me. There are so many things that I like about it, but I also can't help wondering how in the world this car works. Maybe we've been overdoing it in this industry. The Double-"O" is the classic KISS principle in action (keep it simple, stupid!), yet it's highly competitive. I wish there were a high-tech name for a rubber band, though—maybe "super bungee"? Many people will shy away from this car because of the way it looks. (That much was obvious, judging from the comments from people who looked at the car before it hit the track.) You should have seen the looks on their faces *after* they saw it on the track. It wasn't so funny-looking or awkward *then*!

Is the Double-"O" for you? It depends on whether you think that your image is more important than winning. I'll bet that people will forget about images when it's the first to cross the finish line. I'll bet McAllister is banking on that, too!

**Here are the addresses of the companies mentioned in this article:*

McAllister Racing, 1000 N. Humphreys St., Ste. 204, Flagstaff, AZ 86001.

Novak Electronics, 128-C East Dyer Dr., Santa Ana, CA 92707.

B&R Mfg., 2800 Tothill Dr., Saugus, CA 91350.

Max Cell, P.O. Box 1211, Mt. Laurel, NJ 08054.

Autographics of California, 7401-1 White Ln., Bakersfield, CA 93309.

Twister Motors, 657 E. Arrow Hwy., Suite H, Glendora, CA 91740.

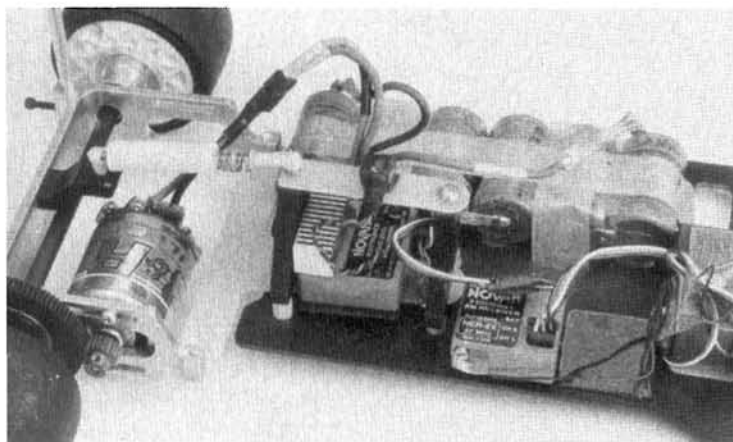
Trinity Products, 1901 E. Linden Ave., #8, Linden, NJ 07036. ■

change the tires. The modified didn't like the blue front/green rear combination at all. Talk about front bite problems! A set of blue/oranges, please!

Much better. Even with the modified motor, the car maintained an extremely low line through the corners. Also, because the car is wide, it wasn't inclined to wander about as narrow cars sometimes will.

After an afternoon of testing and racing this car, I found some of its weak spots. The aluminum rear wing tubes bend very easily! You should carry a couple of spare sets. Also, a violent front-end collision can cause the front axle to shift in its mount. I highly recommend that you install a setscrew in this area, and I think that McAllister should take note of this, too. For the most part though, everything else held up very well.

The Double-"O" is defi-



The ESC is attached to the chassis on the rear T-plate. In this location, the unit is well protected and the wires are short.

netted me this information: you drill two small holes in the rear window, replace the setscrews that hold the wing tubes with socket-head screws, and then you use

well. After a couple of slow laps, I opened this baby all the way up. When I did, I almost fell off the drivers' stand as I watched it glide through that nasty hairpin turn. I mean, it

NITRO NEWS

by JEFF BRONSTEIN

Gas Glossary

GAS RACING has been around since the beginning of R/C, but for many newcomers it's a fresh experience. Until now, this column has provided some basic information (it's always important to start with the basics), but from time to time, it will contain more advanced technical information and specific perfor-



This infrared pyrometer is used to measure heat at the glow plug. Many 1/8-scale racers use pyrometers to ultra fine-tune their engines.

mance techniques. Many of the terms and expressions used here might be unfamiliar to you electric racers. On the other hand, if you ask a gas racer what a milliamp is, he might reply that she was the hot trophy babe at the last big race in Albuquerque. What I mean is: I'd hate anyone to miss the message just because he and the messenger didn't speak the same language. This month's column is a glossary of terms related to gas-powered cars and trucks and the equipment that keeps them smokin'.

SUPPORT EQUIPMENT

Although gas racing requires little more than a car, an engine (or two) and a radio, many racers have adapted highly sophisticated tools to squeeze more performance out of every drop of fuel. A gas racer's toolbox might include some of these neat racing toys...er, I mean tools:

- **Durometer.** This small device, which is roughly the size of a large stopwatch, is used to test and match tire compounds for firmness. Although most foam tires are labeled, they may have slightly different densities or hardnesses. For the car to perform at its best, its tires should be of the same hardness.

- **Infrared pyrometer.** This electronic thermometer can detect the temperature of a 2-stroke engine at the glow plug in roughly 1 second. (Speed is extremely important to obtaining accurate measurements.) This device enables you to make ultra-fine adjustments to keep the engine temperature very close to optimum.

- **Igniter or glow driver.** This cylindrical plug is usually powered by a small dry-cell battery or a Ni-Cd that heats the platinum filament in the glow plug to start the engine.

- **Power panel.** Used with the igniter, this unit provides metered voltage for different types of glow plug, and it can detect broken or faulty filaments.

- **Starter box.** Several, current, 1/10-scale gas cars and trucks have pull-starters, but there's no built-in way to start 1/8-scale race cars. The starter box is a large, 12V motor mounted in a box or on a table. To start the engine, a large rubber wheel on the motor engages the car's flywheel.

- **Tire truer.** Most R/C racers are familiar with this device, which is used to measure tire diameters accurately. Tire truers used on 1/10- and 1/12-scale cars are powered by one motor. Some specially developed 1/8-scale truers have two motors—one for the tire, the other to be attached to the material—that rotate in opposite directions.

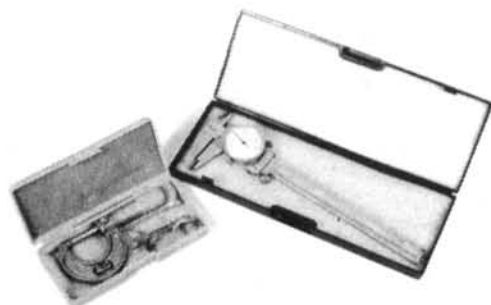


The igniter plug heats the platinum filament on the glow plug to start it. Both the remote plug and the hard-wired version use a 1.5V current from either a dry-cell or a Ni-Cd battery.

- **Calipers and micrometer.** These measuring devices are used to gauge small distances, e.g., tire diameters and cylinder-head spacing shims.

- **Fuel gun.** The fuel gun is used to fill the tank quickly without dripping any fuel on the radio components or tires. Pit stops can be as crucial as driving skills during a main event. Both ends of the gun-like container open simultaneously with the pull of a trigger.

(Continued on page 64)



Both the micrometer (left) and the calipers are used in racing to measure a car's many components and adjustments accurately.



Many racers use tire truers to accurately size tire diameters. Because 1/8-scale cars have considerably larger tires, there are special truers for them; they use two motors instead of one.

ENGINE TERMS & PARTS

Understanding gas lingo is as important as understanding how an engine works. When gas engines lose power, they don't dump, they flame-out. A set of good matched cells in a gas car operates the radio gear, not the tires. Learn the language and rule the school.

● **Heat sink head.** The topmost part of the engine; it provides additional surface area for dissipating heat.

● **Slipper clutch.** A slipper clutch is composed of the engine's flywheel and three or more arc-shaped shoes that are attached to one another at one end with a pin. As the engine accelerates, the centripetal force of the spinning flywheel forces the shoes to engage a bell housing that surrounds the unit. Changing the thickness of the clutch shoes adjusts the clutch to engage quickly or slowly to suit different track, tire and engine conditions. Springs or O-rings can be used to hold the shoes so that they engage at higher rpm.

● **Pipe.** The pipe is the engine's muffler, and adjusting its length (tuning) improves engine response. Built-up pres-

sure from the engine pushes unspent fuel back into the combustion chamber to improve fuel economy and performance. Longer pipes increase rpm to a certain extent.

● **Pressure tubing.** The fuel tubing that connects the tuned pipe to the fuel tank. Back-pressure in the exhaust system pressurizes the fuel tank, and this provides a consistent flow of fuel to the carburetor. The length of the tubing can affect the fuel pressure mixture under changing engine conditions.

● **Head spacing.** The distance between the top of the piston head at its highest position and the bottom of the cylinder head. This space determines the maximum compression of the fuel and air. Depending on fuel or oxygen, it can vary between .015 and .030 inch. Head shims space the cylinder head upward or downward to improve performance.

● **Nitro.** Short for nitromethane, it's a key ingredient in 2-stroke fuel. Although alcohol is the main combustion ingredient, nitro acts as an oxidizer to help the fuel burn more quickly, it improves acceleration, and it can increase top-end speed.

● **Restrictor.** A restrictor is a small conical device that limits the flow of air through the carburetor throat. It may be used to improve fuel economy or to tame a strong motor for loose track conditions, but, in some cases, restrictors actually improve performance by increasing the speed at which the air moves through the engine case. The recently revived ROAR Sportsman class requires an extremely

small restrictor. This keeps the focus on driving, not on ballistic speed.

● **Overdrive ratio.** This percentage tells us how quickly the rear tires are moving compared with the front tires (on 4WD cars, naturally). Traction and steering can be balanced by increasing power at the front or the rear, depending on the



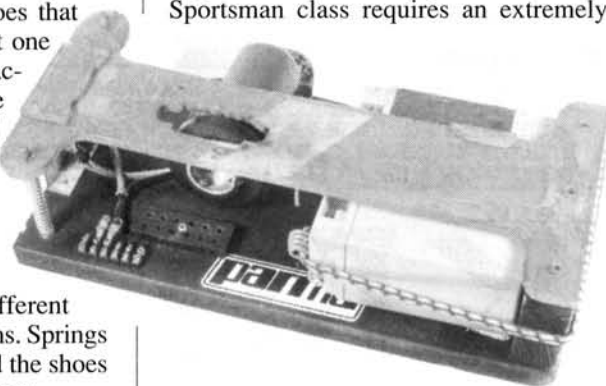
The slipper clutch consists of a series of arc-shaped shoes inside a bell housing. The centripetal force of the spinning flywheel pushes the shoes against the inside of the drive housing. The clutch can be set to engage quickly or slowly, according to the size of the clutch shoe.

track conditions. By changing gears or sizing the tires, the overdrive ratio can be from 0 percent to nearly 10 percent.

● **Throttle over-ride spring.** This small spring that's attached to the carburetor linkage permits the servo to apply brake while still allowing the engine to idle. Adjusting the over-ride to engage the brake and throttle properly is important.

● **Jackshaft.** Most gas-powered cars use two or three shafts to distribute power to the front and rear drive axles. These secondary shafts are usually called "jackshafts" or "midshafts."

It's important to know what the words mean when you're learning about gas cars and trucks. It's almost impossible to describe a problem to someone if you use words like "whatchamacallit" and "doohicky." Gas racers are a great group of people, and there's always someone who will lend a hand. ■



Starter tables come in many shapes and forms. Essentially, a starter table is a 12V motor with a rubber wheel on its end. This wheel engages the engine's flywheel and starts the car.

A Radio Control Model Sport & Hobby Show in FLORIDA?

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JRX-PRO SE

(Continued from page 32)

LRM box by making the diff gears more durable and heat-resistant. Most important, the SE is the first kit to include Losi's new slipper-clutch system (see sidebar).

• **Additional updates.** The SE also introduces several other brand-new items. The tie-rod ends have been redesigned so that they won't bind when they're placed at extreme angles. Also, the rod ends are much longer, which reduces the chance that they'll pull out during a collision.

For the new rod ends, the SE includes a set of small foam disks, uncreatively called "foam things" by Losi. They're mounted between the rod end and the ball so that dirt won't inhibit free movement.

Finally, a brand new body called the "Slim-Line" fits the narrow molded chassis very snugly, and keeps out dirt that can weigh the car down.

SE-RIOUS GEAR

• **Radio Gear.** I chose my trusty Airtronics* Caliber 3P transmitter. This FM unit is controlled by a microprocessor and allows precise programming of all major trim functions, as well as the input and storage of up to three separate vehicle settings. I decided to stick with the Caliber's stock receiver because it fit perfectly into one of the chassis side bays.

I've been driving with fast servos lately, and I've become accustomed to their quick response. I installed a KO Propo* PS-303 FET servo in the SE. The 303 has a .12-second 0- to 60-degree transit time and has 69.3 ounces of torque (with six cells; seven-cell operation raises these figures slightly). I decided that the Novak* 410-M1c, with its small case, high-frequency operation, and low on-resistance, would be ideal for the SE. RPM* has just introduced a molded ESC tray that screws directly to the SE's chassis without modifications. With this tray, you can mount the ESC horizontally, which lowers the car's center of gravity and provides increased airflow across the ESC's heat sinks.

• **Horsepower.** Team Losi factory drivers run their cars with six cells rather than seven, so I assembled a pack of Trinity's* Pushed Panasonic P-170 Team cells. These new Panasonics have the durability of an SCR cell (e.g., a quick "recovery" time, which allows you to charge them more than once a day, and the capability of higher, quicker charge rates), and the run time of an SCE cell. They may be

(Continued on page 82)

R/C MOTORCYCLES HAVE always seemed somewhat mystical. The mere thought of a two-wheel vehicle running without the help of some sort of extra wheels seems amazing—and it is.

R/C bikes have been around since the '70s, but they've never really performed well enough to catch on. Kyosho introduced a great motorcycle a couple of years ago, but it has several drawbacks. It requires special batteries and a special radio system, and it's small, so it needs a clean, smooth surface on which to run. Special oil-filled shocks, which help the bike cope with rough surfaces, are available, but they're expensive. After the mods, the bike runs well, but it lacks the run time and size that most racers desire.



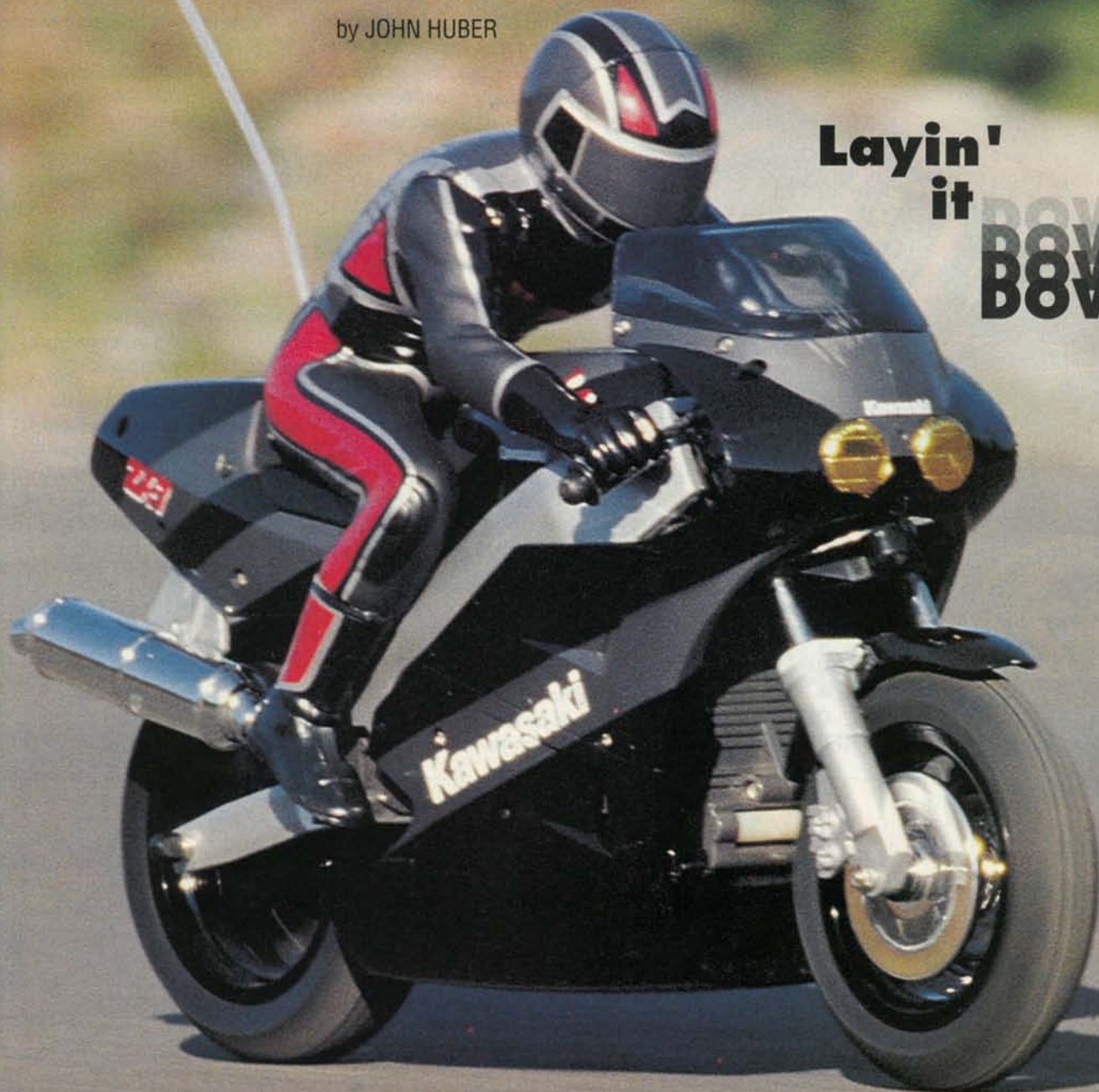
PHOTOS BY JOHN HUBER

ROYAL HYPERSPEED

KAWASAKI

by JOHN HUBER

Layin'
it
**DOWN
DOWN
DOWN**



HYPERACTION

Enter the new Royal* Hyperspeed FZR-750. Like its brother—the 380-powered cycle—the Hyperspeed cycle is 1/5 scale. But this brother has grown up and comes with not only a 540 motor, but also new gears and a built-in ESC to handle the motor's power. Also added to the package is a set of softer, treaded tires for better traction.

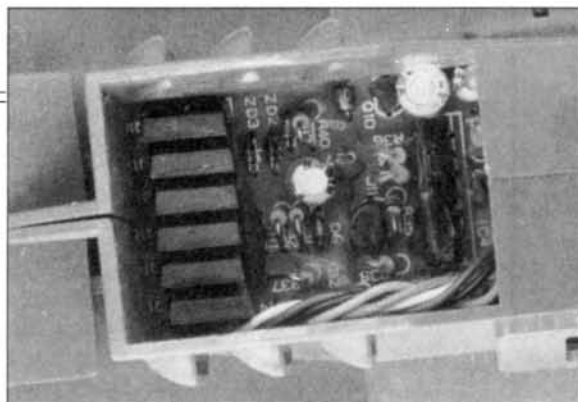
The bike comes completely assembled,

and the radio gear has been totally installed. All that's required are a set of six AA batteries and a 7.2V stick pack and charger. (Anyone who's into R/C cars should already have these items.) The transmitter included with the bike is the stick type, and it's very basic. It has an LED power-indicator light and trim le-

KAWASAKI

vers for both the throttle and steering.

I haven't used a stick radio in some time, but I became accustomed to it very quickly. Now that I've used it for a few weeks, I actually prefer it to a wheel radio for running the bike. The bike never needs the type of rapid countersteering that's required when you race an off-road car, and the left/right control of the stick seems better suited to the leaning of the bike. If you *do* prefer the feel of a wheel radio, however, you can use any 27MHz AM transmitter as long as it's on the same frequency.



A powerful ESC is hidden deep within the bike's plastic frame. It can handle 75 amps of power from modified motors, although I don't recommend motors with fewer than 16 turns.

HERE COMES EASY...EASY RIDER

The first time we drove the Hyperspeed cycle was for the photo shoot. I've driven both the Kyosho and the Royal motorcycles, and I *thought* that I was ready for the Hyperspeed. We were shooting on a half-mile stretch of a two-lane highway that wasn't yet open. Steve Pond launched the bike as I piloted the transmitter. I headed the bike down the road at half-throttle, and Steve and a friend commented on how fast it looked. I agreed, but I realized that it could go even faster.

I turned the bike around by first lightly applying the brakes and easing it to the left. As it reached the apex of the half circle I was making, I applied the throttle and input a little right. It took a little getting used to, but soon we could open the baby up full tilt. For the action photos, we hung out the back of my Explorer with the bike following close behind. We maxed the bike out at a whopping 25mph and had no problems controlling it at that speed. We must have made 15 passes on that strip of road with the bike because we could traverse it so quickly.

A week later, a good friend of mine also picked up a Hyperspeed bike. We headed to a nearby parking lot that was smooth and empty, and we laid out a course that weaved in and out of islands through the lot. That's when it hit me that



To help handle the bumps on rough terrain, I added a short Associated shock. The 30WT oil provided plenty of damping for the rear swing-arm, even though I used only one shock (mounted on one side of the bike).

S P E C I F I C A T I O N S

Manufacturer Royal
Type On-road
Scale 1/5
Sug. Retail Price \$234.95

DIMENSIONS:

Overall Length 16.5 inches
Width 5 inches
Height 12.5 inches
Wheelbase 11.75 inches

WEIGHT:

Gross (with battery) 4 pounds, 10.37 ounces

BODY:

Type Kawasaki ZX-7 Ninja
Material ABS plastic

CHASSIS:

Type Delta-box
Material ABS plastic

DRIVE TRAIN:

Primary Pinion/spur
Transmission Gear/belt
Differential None
Bearings/Bushings Bushings

SUSPENSION:

Type (f/r) Coil spring
Damping (f/r) None

WHEELS:

Front:
Type Plastic
Dimensions (DxW) 3.5x1 inches
Rear:
Type Plastic
Dimensions (DxW) 3.5x1.25 inches

TIRES:

Front/Rear Ribbed rubber

ELECTRICS:

Motor 540
Battery 6-cell stick
Speed Controller Electronic

OPTIONS AS TESTED:

Right out of the box!

COMMENTS:

Because the Royal Hyperspeed features a 540 motor, it really moves. It also opens up the possibilities of using modified motors. The bike provides hours of fun for both beginning and advanced R/Cers. It's nice that the bike uses standard 7.2V stick packs, which most hobbyists already own. The performance with the 540 motor is great, but if you use a modified motor, the lack of suspension damping will be apparent.

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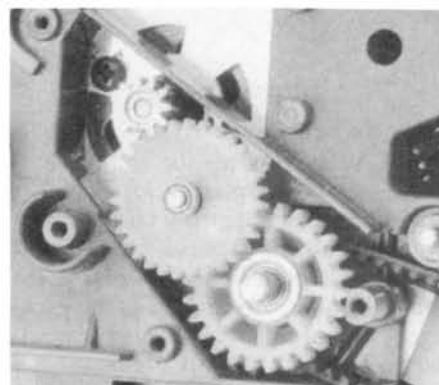
I could *really* have fun with this bike! We dogged it out for a good hour, running the bikes side by side, leaning harder and harder into the turns, pushing them to the limit.

Later, we realized that we had been cutting the corners so closely that the "drivers" had lost most of their toes! That didn't bother us at all, because the bikes could lean even farther when the feet were worn down.

PRECAUTIONS

One thing that we both learned was *not* to apply any throttle or brake when the bike was crashing. After the bike took a mean tumble, I noticed a loud sound from the gearbox. When the bike was tumbling, I had applied full brakes just by instinct. When the rear wheel hit, the force traveled through the rear belt and into a gear; a tooth broke off, and I was out for the day. Replacements aren't very expensive, but Royal will soon offer metal replacement gears that should be stronger.

Another thing we learned was to be careful. There's no bumper on the front of the bike, and I'm glad: it would look horrible. Because of this, however, you don't want to crash into curbs at full



The motor's power is delivered to the rear wheel through a set of gears and a belt. All the gears are supported by bushings, but you can easily upgrade them, as I did, with a set of ball bearings.

mission for a few days. Just play it safe and avoid potentially dangerous situations.

MODIFICATION CAPABILITIES

Although the bikes performed almost flawlessly out of the box, all we could think about was how to make them better and faster. I was told that the ESC could handle the current from a 16-turn motor, so I threw one in. I also put in a full set of ball bearings. Royal sells a set for the front and rear wheels, but I had to search my hobby shop for the ones for the gears. The bike was noticeably faster: I'd estimate that it went at least 30mph. The speed, however, proved too much for one section of our course: when we ran full tilt down the back straight, *any* bump sent the bike tumbling and scraping across the pavement.

The bike survived several wipe-outs, and we found the cause of the problem. The rear spring is of exactly the right tension to support the bike and handle the bumps, but there's no damping whatsoever. When the bike hits a good bump at this faster speed, the rear hops slightly and usually goes wild. Some of the problem stems from the front suspension, which has stiff springs and again, no damping.

Good news though: we solved these problems by installing an oil-filled shock on the rear from an off-road buggy and by modifying the front suspension slightly. You'll see more about these modifications when I do "Project Hyperspeed." I'm also planning to make a lighting system for the bike for night riding, so I won't crash into that curb anymore!

**Here's the address of the company featured in this article:*
Royal Products Corp., 790 W. Tennessee, Denver, CO 80223.



Like many R/C cars, the Royal bike uses standard 7.2V stick packs. This is great because you don't have to buy special batteries.

speed. The bike can take skids and slides and even the occasional flip, but direct head-ons are a no-no!

One night, we were racing at the parking lot, and I was having trouble seeing one poorly lit turn. By the time I noticed that I was heading for the curb, it was too late—bam! The bike survived but the front fender broke. I still had trouble with that corner; I hit the curb a couple more times that night, eventually breaking part of the front end. Again, replacement parts were no problem, but I was out of com-

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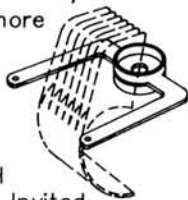
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TRUCK STOP

by DAVE SPROUL

Show Stoppers!

THE ANNUAL model/hobby show in Chicago has always been a showcase for new products, and the '91 event was no exception. I won't pretend to have seen all the new truck products, but I will pass along info on some of the exciting products that I did see.

One of the most significant monster-truck releases is the radical new Clod



Sassy Chassis' Clod Buster suspension kit has cantilever-activated shocks and stock suspension arms.

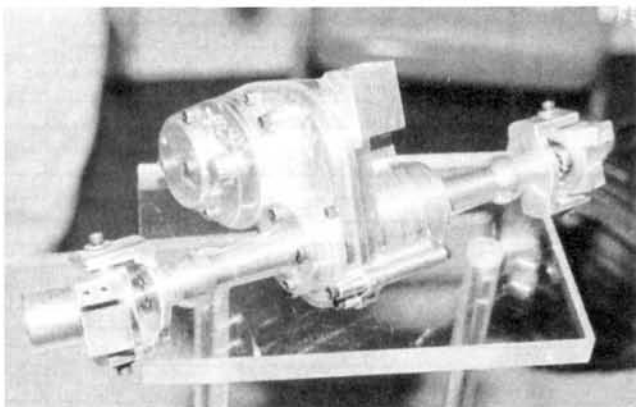
Buster suspension kit, and it's offered by no fewer than *three* manufacturers. PDI's* "Clod-a-lever" kit is probably the most exotic. It consists of four-link control arms, sway bars and cantilever shock operation and, to use it, you have to move the steering servo. It will fit Clods and Bullheads equipped with stock,

Sassy Chassis* and ESP* chassis. Although the PDI kit has many parts and looks a little intimidating, its instructions are very comprehensive, so installation should be easy.

ESP also displayed its multi-link system, which uses a four-link setup that offers you the option of mounting the shocks vertically or at an angle. This system is less complex than PDI's, but ESP claims that it works very well. It will fit the stock chassis, ESP's ladder-frame chassis and Sassy Chassis aluminum replacement chassis.

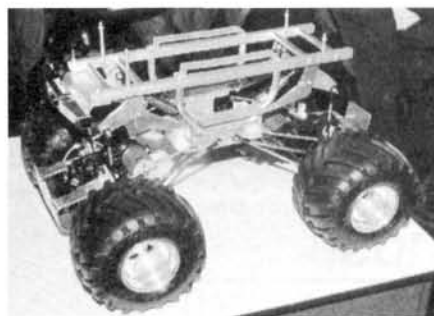
Sassy Chassis displayed a cantilever shock system that, at the moment, only fits Sassy-equipped Clods. Instead of using replacement suspension arms it uses the original, plastic ladder bars, and it comes with four shocks.

I haven't had the opportunity to test or assemble any of the kits, so I won't speculate on which is best. I will say that each will improve your Clod's handling by increasing its suspension travel (something stock Clods seriously lack). The kits differ in terms of how they're assembled/installed and how much they cost so, to decide which one to buy, contact the manufacturers and get the facts on each before you plunk down your hard-earned bucks. If I have the opportunity to test these kits, I'll pass my comments along.



JPS offers new machined-aluminum gearboxes, axle tubes, steering knuckles and non-steering rear axles for the Clod.

JPS* was at the show to display its incredible new machined-aluminum Clod Buster gearboxes and machine axle tubes, steering knuckles, steel gears and axles. This stuff is expensive, but it's really trick! The parts should interest pullers and monster truckers alike.



Here's PDI's "Clod-a-lever" multi-link, cantilever suspension mounted to an ESP chassis. The kit can also be used with Sassy Chassis and stock chassis.

Stay tuned, because I have a complete rear setup on order, and I'll report on it in the next "Truck Stop" column. JPS also offers aluminum bumpers and wheels for a variety of vehicles. Check 'em out.

SCI* was on hand with its new heavy-duty electronic speed controller—the Monster Card. It features forward and reverse control, 4 to 24V operation and a



Kyosho's new Toyota 4Runner features incredible scale details and performance.

210A continuous-current draw with an 800A surge. SCI states that the Monster Card can easily handle two modified motors, and I intend to find out if this is true. I've received a sample that I plan to test in my modified USA-1 race truck. Look for more information on this controller soon.

Parma International* introduced its Snakebite monster-truck body in a big way! The full-size Snakebite truck, which has been seen at monster-truck shows around the country, was at the Parma booth! Parma has licensing agreements

with several famous monster trucks, and the company has created decal sheets that enable you to make your R/C truck look like your favorite full-size truck.

For scale buffs, Kyosho* introduced the new Toyota 4Runner kit. Designed primarily as a scale-type vehicle, it falls into the same category as the old Tamiya Bruiser. It features: full-time 4WD; an independent front suspension; a live-axle, five-link rear suspension; three differentials (one in the transfer



Parma's new Snakebite body replicates the body used on its full-size counterpart.

case); provisions for an optional, second motor; and an incredible scale body with chrome accessories. This truck would make a good tow vehicle for your pulling truck, boat, race car, etc. Watch *Car Action* for a complete review soon.

That's about all I have space for in this issue; the new truck stuff just keeps on coming, and I love it! Until next time...it's been nice! See ya!

**Here are the addresses of the companies mentioned in this article:*

PDI, 16922 NE 124th St., Redmond, WA 98025.

Sassy Chassis, 906 Ridgewood Dr., Cary, IL 60013.

ESP Manufacturing, 20 Crystal Lake Plaza, Crystal Lake, IL 60014.

JPS Custom Wheels, P.O. Box 3014, Fullerton, CA 92631.

SCI Corp. of America, P.O. Box 13099, Sarasota, FL 34278.

Parma International Inc., 13927 Progress Pky., North Royalton, OH 44133.

Kyosho/Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61824.

New In '92

RC-10 and RC-10T

2003 RC-10 Telescoping Drive System w/H-Arm for Stealth **64.95**

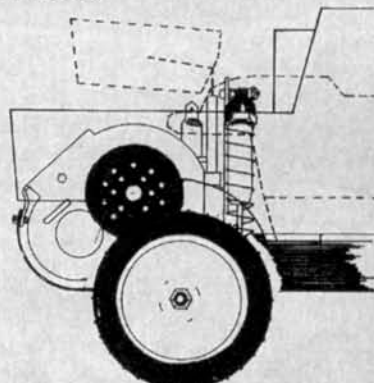
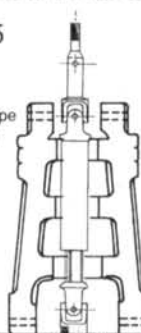
2005 RC-10T Telescoping Drive System w/H-Arm for Stealth **64.95**

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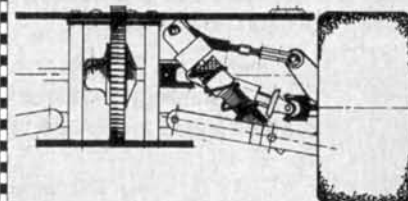
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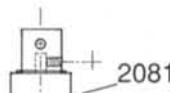
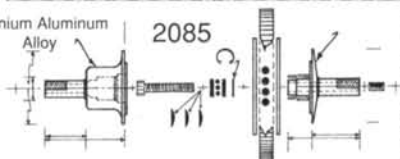
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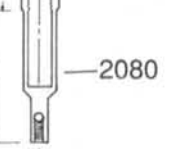
2085



2081



2084



2080



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GET STARTED IN

R/C

PART IV

• RACING REGULATIONS •

MY WHOLE REASON FOR this series of articles is to get you into R/C competition. It doesn't matter whether you compete in the backyard or at an organized racing club, you still want to get the most satisfaction for your money. The best source of information about competition in your area will be your hobby shop. If it doesn't sponsor races itself, you can be sure that it displays posters that will tell you where to go.

You can race off-road cars on any surface. You can mark out a course just about anywhere there's enough room. Try your backyard, an unused lot, or a paved parking area. Make the "skinned" area of a baseball diamond into a flat dirt track.

If there's no organized racing in your area, you might want to form a club. Find an accessible place for the track. There's often unused land beside or behind small shopping centers and malls. Get the owner's permission before you go any further! Because of the shopper traffic, your club will receive exposure. You could also point out to the landowner that your club may attract attention

to the property, and it could possibly stimulate some extra business at the mall!

When the snow flies, the outdoor R/C season is over. Don't overlook organizing club races indoors. You'll need a large, open area, which means you must find a building without supporting fixtures in the middle of the floor. One possibility is a roller-skating rink. Talk to the owner of a local rink. He may have a slow or open evening on which he might be willing to rent the rink to your club for a few hours. There are three such roller-rink R/C tracks in Rhode Island; they're popular all year long, but especially so in the winter.

Once you've found (or created) a place to race, organize your equipment and prepare your car. When you pack to attend a race, take everything that you'll need, but stick to the essentials. If you're going to race on a loose dirt track, leave the foam tires at home. If you plan to race on asphalt, don't pack the pin-spike rubber tires. If it's a stock event, you won't need that modified motor. Be certain that what you have with you is appropriate for the kind of racing you'll be doing.

by BOB GAGNE

PRE-RACE PREP

Your pre-race preparation should be done at home on your workbench, not at the track. It should entail mounting your tires on the wheels; checking and lubricating all bearings/bushings; checking your motor; inspecting your motor brushes and springs; inspecting and adjusting the suspension system; and looking for leaky shocks or shocks that are out of oil. Most important: *check your batteries*. I charge all my batteries at home and then peak them just before I race. With pre-charged batteries, you'll never be caught unprepared at the track.

TOTE THAT STUFF

Now that everything is ready, how do you get it all to and from the track without making 50 trips? You don't need fancy carrying equipment. A cardboard box is fine until you know what kind of carrying device is suited to the way you organize your gear and the what you take with you to the track. Plastic or wooden crates work well for carrying large things like your buggy, transmitter and charger. An old tackle box or a toolbox will help you to organize small parts and tools. Field bags and pit boxes work well, but I don't suggest that you buy one until you're sure which kind will work best for you. You might want to make a check list of things you'll need at the track. As you pack, check off each item.

When you get to the track, unpack only what you'll use. Putting everything on the bench just clutters your work space and adds to the confusion. Bench space is usually very limited, so be courteous and don't spread your equipment out too much. Set up your charging equipment so that you're ready to peak your batteries. Also, be sure to check in with the race officials. Sign in and get a copy of the rules, if



Indoor tracks like this one become more popular in the winter. Roadcourses and ovals are the most popular forms of indoor racing.

any are available. Know the track's regulations about radio identification, impounding and frequency clips during practice. You should also know the track's etiquette before you start.

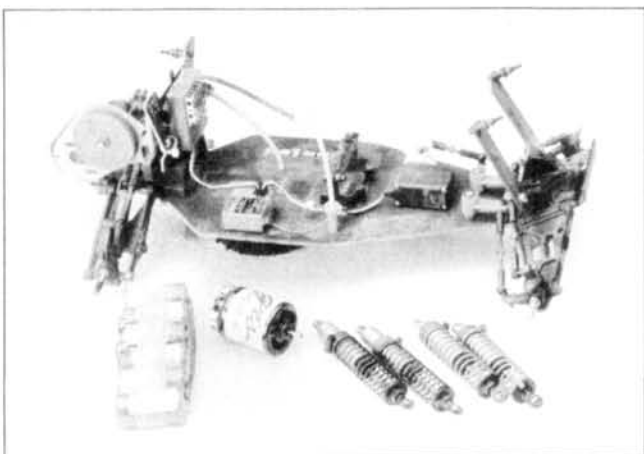
Practice as much as you can before a race, but give yourself at least 15 to 20 minutes of prep time before the qualifying heats are scheduled to begin. When you dial your car in to a new track, run for a minute or two to get a

more annoying to other racers than having to wait for an unprepared driver. If you aren't ready to run when your heat is called to the starting line, the race director has every right to start the race without you!

After you've finished your heat, take your car off the track immediately and shut off your receiver (in the car) and then your transmitter; unplug the battery pack and return the transmitter to the impound area. Generally, you'll be required to corner-marshal the heat that follows yours. Be in position without having to be prompted by the race director.

When you've finished your duties, go back to the pits and prepare your car for your next heat. Peak your battery pack. Clean your car body, chassis and tires. If time permits, remove your motor and clean it completely. Be sure that it has cooled down; if you spray a hot motor with motor cleaner, you might crack the insulation on the winds and ruin the motor. Avoid the temptation to watch the heats after your own. It would be nice to watch all the races, but being prepared for the next race is more important.

After the qualifying heats have been completed, the race director will organize the Mains for each class or division. Pay attention to when your Main will be run. Prepare your car just as you prepared it for the heats. At this point, you may want to make minor adjustments, but be sure you know exactly what each adjustment will do to your car. Major adjustments are out! Go with the way the car was set up for the last qualifier. The most important thing



When you've finished racing, remove the motor, the batteries and the shocks so that you can clean the car and each of these items.

feel for the track, then make minute adjustments or tire changes and hit the track again.

ON YOUR MARK, GET SET, GO

When the heats have been posted or announced, check your assigned number, make sure they've listed your frequency correctly, and know when you're expected to put your buggy on the track for your heat. When your heat is called, be ready to race. Nothing is

is to be ready to race when your Main is called to the starting line. After your Main, win or lose, good sportsmanship is important. A handshake and congratulations to the other competitors go a long way.

After the race, be sure to remove your battery pack and put your equipment away carefully. You might want to use your check list again to make sure that you leave with everything you brought.

MAINTENANCE

After you've unpacked at home, prepare the car for its next race or practice session. Maintenance is essential for consistently good performance.



Boxes like the Plano Phantom Pro are great for carrying your equipment to the track.



After you've removed the motor from the car, remove the springs and brushes, and clean the commutator.

As soon as you can, inspect your buggy for damage, loose parts or anything that isn't right or looks suspicious. Early inspection will give you a little time to get parts and make repairs, if you must.

Clean your car thoroughly. Dirt can damage electronic components, even when they're not in use. Your car is new (or almost new), so wear isn't an issue here, but it will become a problem if you don't clean the car thoroughly. The cleaner your car is, the longer it will last.

Take care of your batteries. Clean and inspect the shrink-wrap, wires and plugs for damage. Repair anything that looks "questionable." If your batteries look OK, be sure that they've been fully discharged. Although there's a great debate about the proper way to charge them, everyone agrees that, if you want top performance from them, the batteries

must be fully discharged and then allowed to rest before they're recharged. To do this, you can use the discharger that's built into most "timer" chargers, you can build a "dumpster" (see *Radio Control Car Action*, August '90), or you can use one of the slow, voltage-regulating units that stays attached to the battery until you're ready to charge it.

Cobra* Battery Bugs cost from \$4 to \$6.50, depending on the model. (I've used them for several years.) Gecko* makes a similar unit for about \$7, and Bold Creations* makes a "Powerdump" that's similar to the *Car Action* "dumpster," as well as a slow-discharge unit called the "Power Lock" that's available for \$3.95 to \$14.95 for a pack of four, depending on the model.

Thoroughly clean and lubricate your motor. The longer you leave your motor dirty, the harder it will be to clean. Use a motor-cleaner spray to remove the dirt. Remove the brush springs and the brushes, and spray the brush hoods and the bearings. A Cheetah* Blaster Plus (or a similar device) helps to direct the spray more effectively. Spray into the bottom of the can around the armature, then let the liquid drain out completely. Use a

(Continued on page 142)

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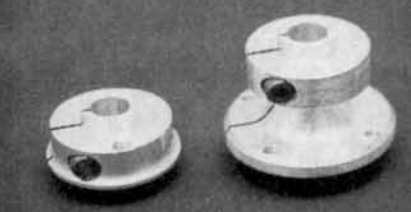
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64 PITCH - 14T TO 48T

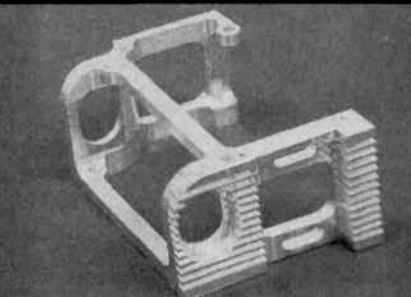
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JRX-PRO SE

(Continued from page 66)

the future of modified racing. With the additional run time afforded by the P-170s, you can use hotter modified motors that will match seven-cell horsepower. I used one of Trinity's new Championship Series motors—a 12-turn, triple-wind called the Speed Metal. The Championship Series motors use a new, hot purple can design.

SE PERFORMANCE

I headed for Car Action's official test-track—Queens Off-Roaders in Long Island City, NY—to put the SE through its paces. When the track becomes packed down, I use small-to-medium pin-spoke tires on the rear of the car, and Losi HT ribbed tires up front. With my initial setup, the SE was very stable and had a "locked-in" feeling out of the turns—mostly owing to its long rear A-arms.

It wasn't turning in as much as I would have liked, so I replaced the no. 1 rear pivot-block with the no. 2 to slightly reduce rear anti-squat. This improved the response into the turns, but I still needed a little more because I still had to slow

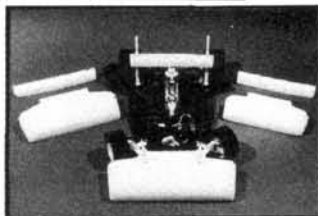
(Continued on page 90)

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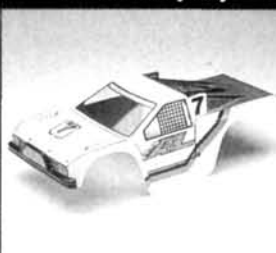
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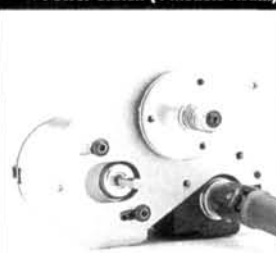
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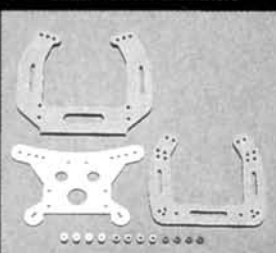
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N O R R C A CARPET OVAL NATS

by JIM SHEPKA

Carpet Crusaders

SOME OF THE best young talent in oval racing came to beautiful New England for the 1991 NORRCA Carpet Oval Championships, which were held at the impressive Foxhill Speedway in Wakefield, MA, on October 4-6, 1991.

This track is one of the best of its kind in New England. Besides a well-stocked hobby shop, a snack bar and plenty of pit space, this racing track boasts a center line of nearly 350 feet! One of the unique features of this track's layout is the reverse bank, or kink, that's on the straight directly in front of the drivers' stand. As you exit turn two, you're confronted with a slight rise and a reverse-banked, right-hand turn followed by a slight downhill chute into a large sweeper (turns three and four). Theoretically, if you take a straight line between turns two and three, you shouldn't have any problem negotiating this section, but it isn't always that simple. I recommend that you "freight train" through it rather than run side by side. If you don't negotiate the kink, you can destroy your car.

LTO chassis configurations are the norm for oval racing, so the kink presented many problems for the drivers. The locals, who were accustomed to this unusual design, had a definite edge. Those not as fortunate spent a lot of time trying to figure out the



line that would allow them to take this section flat out. Missing the line meant that you'd have to let off the throttle and attempt to bring your car back to the right to set it up properly for turn three (remember, 99.9 percent of the cars are LTOs). Many expletives were uttered early on!

We knew from the start that this track, with its 350-foot-long center line, would give us one ballistic event. Because a large field was expected, and because there was some suspicion about stacked qualifiers, NORRCA President J.R. Sitman decided to hold a two-lap individual qualifier (time trials) and group the heats according to the best

one-lap run. NORRCA runs topnotch events, and it introduces some interesting ideas to the program. This unusual, popular approach encouraged many drivers to scramble in search of that "little something extra." Smaller wings,



J.R. Sitman of NORRCA checks the stock motors. The motors are completely torn down to determine whether they comply with NORRCA rules.



Dave Bachelder's Concoors-winning Sunoco no. 44



Danny Jenkins's 2nd-place no. 94 Sunoco.

THIS JUST IN...

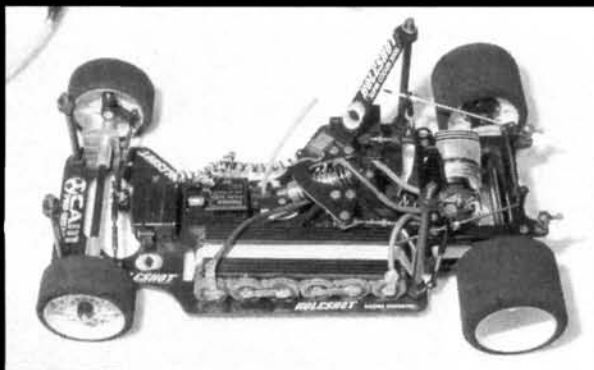
National racing events are usually good places to check out some of the latest releases by manufacturers. This event was no exception.

Holeshot Racing Products*, makers of high-quality heat sinks, displayed a really neat battery heat sink that fits directly over a 6-cell pack. You can tape this aircraft-grade aluminum, 1/2 ounce, black-anodized device directly to the top of the pack to aid cooling as you charge or discharge it. Company president Tony Bernardi recommends that you use the heat sink with SCEs because these cells generate excessive heat during competition. A split-pack version (three and three) is also available.

Jack Rimer of JACO Racing Products* was on hand with his company's foam tires. Mounted on a very attractive star-pattern rim, JACO tires are available in a wide range of compounds, from the more traditional blends, i.e., blue and green, to the more exotic, ultra "Hi-Bite" rubber compounds that are found on 1/8-scale gas cars. These tires are seamless, so they aren't affected by tire compound, which can cause other tires to separate.

They're also very popular on asphalt because of the high concentration of rubber in the tire. With many compounds to choose from, you shouldn't have any trouble finding the right combo for your track. I suggest that you try out a pair of these high-quality shoes.

Vantage Engineering's* new Digi-Charge linear battery charger was another hot item. A built-in digital meter monitors not only battery voltage and current charge but also power-supply voltage. It operates on any 12V DC source (including a car-battery charger), and it comes with a one-year limited warranty. The Digi-Charge Plus model also incorporates a high-capacity, 10A discharge feature that quickly dumps a pack after a run. What else could you ask for in a charger?



Holeshot racing's battery heatsink helps to dissipate heat generated during charging and discharging.

bigger gears and SCRs were some common changes, but most racers adopted the "If it ain't broke, don't fix it." approach.

Open lap times ranged from 6.4 to 6.7 seconds, and they gradually came down as the local shoes started to dominate. I guess when you run 9-turn motors with SCRs, anything is possible.

When the qualifiers had been completed, the heats were organized, and the frequencies were checked. Only six to eight cars would run in each heat so that the best possible times could be run with little traffic. Remember, you run against the clock, not the competition!

CONCOURS

The caliber of the cars that appear at these events is mind-

boggling. Two categories were offered: Most Realistic and Best Paint.

It was a tough call, but Dave Bachelder's beautifully detailed Sunoco took the top spot. Complete with a full interior, working lights,

hoses and a camera, this replica of the original full-scale Sunoco race car was wonderful. Danny Jenkins's no. 94 Sunoco (in its current colors) followed closely in 2nd. Jim Caissie rounded out the field in 3rd.

In the Best Paint category, Dave's brother and A-Main finalist Andy Bachelder took 1st with his beautifully painted Team Clean ride. Silver went to John Polakiewicz (another A-Mainer) and 3rd went to Tom Dubey in the Hi-Pro special.

THE MAINS

After two days and five rounds of qualifying, it was finally time for the big show. During their initial meeting, the drivers decided that triple A-mains would determine the winner. That meant the A-Mains would be run three times, and points would be awarded for each round (1st—100, 2nd—99, etc.), with one throwaway round factored in. The tie-breaker would be the racer's original qualifying position (this format is very similar to the that used at the Worlds). This approach is very popular with racers because it takes the element of luck out of the equation. The cream always rises to

the top!

I'll cut to the chase: here are the highlights.

STOCK

In the Direct Drive Stock Class, TQ Frank Capone took the top spot in the 1st and 3rd heats. Eric Dimmick, who started in 8th, came from the back of the pack to finish a solid 2nd in rounds 1 and 2. Quad Jones, who qualified in the middle of the pack, got it together in rounds 2 and 3 and took a 1st and a 3rd. Derek Roberts was also in the hunt, finishing 3rd in two of the heats, but he ended up a few points short. After the motor tear-down, it was official: Capone, Dimmick and Jones were the winners.



Here are the winners with the goods. From left to right: Frank Capone Jr.—Stock; Warren Strong Jr.—Pro-Stock; and Bob Richard—Open.

PHOTOS BY JIM SHEPKA



In carpet racing, every setting is critical. Here, a young racer tries a different gear ratio.

PRO STOCK

This is the first time this title has been offered at a national event, and it turned out to be a great decision. This was some of the best racing of the weekend as the top 12 drivers (each with 34 laps) were separated by only a few seconds.

The qualifiers were dominated by

(Continued on page 162)

TEAM SPIRIT

Seven teams vied for the top slot in the unique NORRCA Team Cup Challenge. Based on the results of each driver, points were awarded to their respective teams. In the end, SpeedCraft Racing took the top honors, followed closely by Holeshot Racing Products and the local favorite, B&J Hobbies (Foxhill Raceway).

Another neat NORRCA event is the Trophy Dash competition. The top four drivers in each category go for the gold in a two-minute dash to determine the best of the best.

In the Direct Drive Stock division, Eric Dimmick took home the gold with an impressive wire-to-wire victory over Quad Jones, Charlie Gallant and Dennis Ayer. The winning margin was .39 second!

At this event, NORRCA introduced a title opportunity for Direct Drive Pro Stock Drivers. This class was very popular, as evidenced by the large turnout of drivers. Warren Strong Jr., who established a new track record in qualifying, clipped the inside board in turn one and went turtle. Before a corner marshal could get to his Lynx, he was nearly $\frac{3}{4}$ of a lap down. It wasn't long before he set his sights on the lead pack and started to make up some serious real estate. Chris Souza soon broke down, leaving only Sean McCarthy and Jim Holland to deal with. Strong caught the leaders at the 90-second mark and pulled away to a memorable victory. McCarthy held on to 2nd over Holland.

In the open division, local favorite Bob Trigger was the first one eliminated when his cells failed. David Rose took the lead, followed by Andy Bachelder and Bob Richard. These aces put on an impressive driving clinic while turning in some of the hottest laps of the weekend. In the end, Rose held off Bachelder and Richard for the win. The top three were separated by less than 1 second at the finish!

WINNERS

STOCK

Fin	Name	Chassis	ESC	Motor	Battery	Body	Tires
1	Frank Capone, Jr.	Lynx SS	Tekin 411		Hi-Pro	Andy's T-Bird	TRC
2	Eric Dimmick	Lynx SS	Tekin 411	T H	Team Smooth	Andy's Lumina	Minitech
3	Quad Jones	10L SS	Tekin 411	R A	Team Smooth	Andy's T-Bird	TRC
4	Derek Roberts	10L SS	Tekin 610	I N	Bullet	Andy's T-Bird	TRC
5	Charles Gallant	10L	Novak 410	N D	Perfect Match	Bolink Pontiac	TRC
6	Dwight Baugher	10L SS	Tekin 700	I O	Max Cell	Assoc. T-Bird	TRC
7	Chuck Carter	10L SS	Novak 410	T U	Max Cell	Bolink Pontiac	TRC
8	Michael Dubey	Lynx SS	Tekin 411P	Y T	Hi-Pro	Bolink Pontiac	Pro Star
9	Dennis Auger	Cobra	Tekin 411P		Granite Star	Bolink Lumina	TRC
10	Gregory Pace	Cobra SS	Tekin 411P		Team Smooth	Bolink Olds	TRC

OPEN

Fin	Name	Chassis	ESC	Motor	Battery	Body	Tires
1	Bob Richard	Speed Craft	Novak 410	Speed Craft	Team Smooth	Bolink Baretta	TRC
2	Bob Trigger	Lynx II	Tekin 600	BT Special	Bullet	Bolink Baretta	TRC
3	Shane Kocher	10L SS	Novak 410	Trinity	Trinity	Bolink Pontiac	TRC
4	Frank Killiam	10L	Tekin 411P	Reedy Mr. T	Pacific	Bolink Lumina	Pro Star
5	Joshua Piccirillo	Speed Craft	Novak	Trinity	Litespeed	Andy's Pontiac	TRC
6	Jim Holland	Lynx II	Tekin 411P	Cam	Team Smooth	Bolink Pontiac	TRC
7	Andy Bachelder	Cobra SS	Tekin 411P	Trinity	n/a	Bolink Pontiac	Jaco
8	David Rose	Cobra SS	Tekin 420F	Pocket Rocket	Max Cell	Bolink Pontiac	TRC
9	John Stoddard	Speed Craft	Tekin 411	Speed Craft	Team Smooth	Bolink Olds	TRC
10	Sean Pelletier	10L SS	Tekin 420F	East Coast	Team Smooth	Assoc. Lumina	Jaco

PRO STOCK

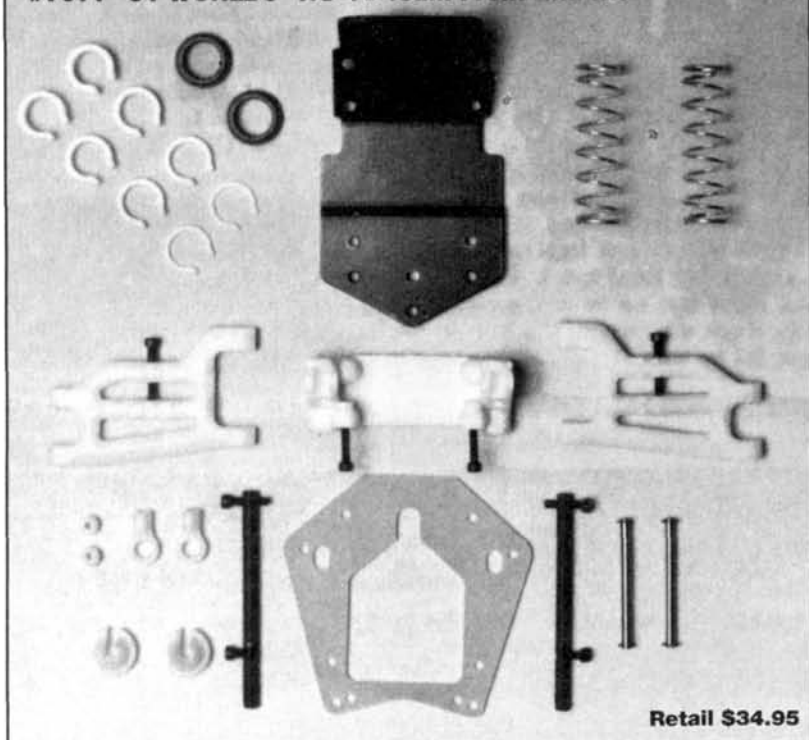
Fin	Name	Chassis	ESC	Motor	Battery	Body	Tires
1	Warren Strong Jr.	Lynx SS	Tekin 411P	Joel Johnson	Trinity Pushed	Bolink T-Bird	TRC
2	Sean McCarthy	Cobra SS	Tekin 411P	Cam	Bullet	Assoc. Lumina	TRC
3	Andy Bachelder	Cobra SS	Tekin 411P	Cobra	Max Cell	Bolink Pontiac	TRC
4	Joshua Piccirillo	Speed Craft	Tekin 411P	Speed Craft	Team Smooth	Andy's Lumina	TRC
5	Bob Trigger	Lynx II	Tekin 600	Trinity Slot Machine	Bullet	Bolink Baretta	TRC
6	John Polakiewicz	10L SS	Tekin 700	Trinity Slot Machine	Team Smooth	Bolink Baretta	TRC
7	Chris Souza	10L SS	Novak 410	Cam	Max Cell	Bolink T-Bird	TRC
8	Jim Holland	Lynx SS	Tekin 411P	Cam	Ballistic	Bolink Pontiac	Jaco
9	David Rose	Cobra SS	Tekin 420F	Magna Torque Stock	Max Cell	Bolink T-Bird	TRC
10	Bob Richard	Speed Craft	Novak 410	Speed Craft	Team Smooth	Bolink Baretta	TRC

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JRX-PRO SE

(Continued from page 82)

down too much to make the corners. I moved the upper front shock mounts to the outermost hole, and the steering was almost ideal. Lastly, I trimmed the outer row of spikes off of the Jammin'* mini-pin rear tires so that the outside rear tire would "drift" more when the chassis rolls during cornering.

Team Losi has come up with a winning package. For less than the price of a JRX-Pro (owing mostly to the low price of the molded chassis), you can purchase a state-of-the-art racing car that needs no after-market accessories to take home the gold. The car's slight, inherent "push" on hard-packed tracks can be remedied easily by minor chassis tuning. The SE's stability is second to none, and it's one car that can be driven hard out of the corners. The gauntlet has been thrown down!

*Here are the addresses of the companies mentioned in this article:

Team Losi, 13848 Magnolia Ave., Chino, CA 91710.

Airtronics Inc., 11 Autry, Irvine, CA 92718.

KO Propo; distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.

Novak Electronics, 128-C E. Dyer Rd., Santa Ana, CA 92707.

RPM, 14978 Sierra Bonita Ln., Chino, CA 91710.

Trinity Products, 1901 E. Linden Ave. #8, Linden, NJ 07036.

Jammin' Products; distributed by Team Losi. ■

SCOPING OUT

(Continued from page 46)

Piggy driving—because it's a little heavier than most buggies (big wheels and a roll cage—not to mention the pig!), and its tires hook-up well on carpet, pavement, or dirt. The Sideways body also fits closely around the ESC and limits airflow, so it's good to test for overheating.

Installation was quite easy because Tekin includes a full-color connection schematic. It's ironic that this budget-priced ESC comes with Tekin's best instruction book, which includes a detailed section that describes the correct transmitter-switch settings for most popular transmitters.

I can't vouch for the accuracy of the instruction for the set-up of all types of transmitter, but the instruction book was "right on" for my Futaba Magnum Jr. It's great that Tekin packages an informative instruction book with its sport-model controller. To be successful, newcomers, in particular, need good instructions.

(Continued on page 98)

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PHOTOS BY JEFF BRONSTEIN



From Russia with love

by JEFF BRONSTEIN

DATELINE: Moscow. Following a failed coup, a new age has dawned in the Soviet Union. The Communist Party is effectively dead, and a new flag of red, blue and white unfurls. An R/C car might have been considered too frivolous for the Communist Manifesto, but today it's a reality.

On a recent trip to the U.S., two Russians sold a unique race car to the Ayatollah of Radio Controlla. Now, in the spirit of a new and better world order, we share this technology. The "Mockba," or "Moscow," is a 1/8-scale, on-road car with all the high-tech features. Complete with 4WD, disk brakes, oil-filled shocks and a gear diff, the Mockba resembles current, standard, western race cars. It's apparent that the car's basic design had been derived from several different 1/8-scale cars. Its overall blueprint resembles portions of the Serpent 6000 Series and a BMT Blitz car—sort of a Frankenstein approach.

Most of the suspension parts and chassis pieces are injection-molded with a brittle blue plastic. Unless the Russians are planning to clone Cliff Lett and allow him to drive the car, it's obvious that the Mockba won't withstand a lot of

(Cont. from page 93)
abuse. Both the chassis and the radio tray are of the usual aluminum, but because of its poor grade, they're less rigid. The car looked as if it would perform well, but the final test would be on the track.

The basic double-wishbone suspension uses torsional springs and shock absorbers that are mounted on lever arms and attached to the A-arms. A small setscrew at one end of the suspension spring is used to adjust spring tension and ride height. Its front and rear anti-sway bars resemble those of the Serpent's,

steel piston rod. Most of the front-wheel drive equipment and the steering block setup are pure Serpent right down to the wheel design.

Unique to the Mockba are its drive train and differential. Most 1/8-scale cars use a belt drive that connects the two-speed

of the older chain-drive RC-500, it's a sure bet that the rear end is bulletproof.

On the main jackshaft is an unusual slipper assembly for the front-wheel drive that gives the rear wheels more traction than the front. Teflon plates grip the front pulley to deliver

power to the front. An adjusting nut varies the amount of slip.

I was eager to see just what the diff housing concealed. Although some 4WD racers still use a "live" diff in the rear, it's usually a ball type similar to that of most

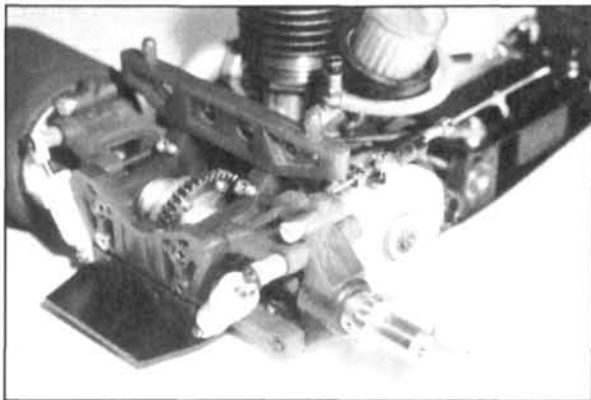
jackshaft to the rear diff. In this case, the belt is replaced by a set of machined gears that are mounted on aluminum housings. Although the gears are somewhat reminiscent

1/10-scale cars. Just from the feel, I could tell the Mockba diff is probably a gear setup. Sure enough, its fully sealed diff housing contains four spider

(Continued on page 96)



I was really lucky with the mesh between my Serpent pinion gear and the Mockba's two-speed gear. They fit almost perfectly.



The Mockba's upper and lower A-arm setup is very similar to that of the Serpent, but the Mockba's brittle blue plastic isn't as resilient as reinforced nylon.

but the front cantilever system uses a sloppy double-hook joint rather than a ball-socket setup. White plastic shocks conceal an aluminum body and a stainless-

Mockba

Type 4WD on-road gas
Scale 1/8
Price Unknown

DIMENSIONS:

Overall Length 19 inches
Width 10.5 inches
Wheelbase 12.75 inches
Track (l/r) 10.5 inches

WEIGHT:

Gross (with engine) 5 pounds, 8 ounces

BODY:

Type Associated Elfin*
Material Polycarbonate

CHASSIS:

Type Pan
Material Aluminum

DRIVE TRAIN:

Primary Pinion/spur/clutch
Transmission Jackshaft/gear
Differential Gear
Bearings/Bushings Bearings

SUSPENSION:

Type (l/r) Upper/lower, fixed A-arm/H-arm
Damping (l/r) Oil-filled shocks

WHEELS:

Front: Type One-piece lightweight nylon
Dimensions (DxW) 2.1 x 1.4 inches
Rear: Type One-piece lightweight nylon
Dimensions (DxW) 2.1 x 2.4 inches

TIRES:

Front/Rear Foam

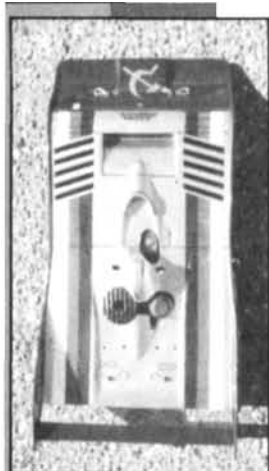
OPTIONS AS TESTED:

Airtronics® CS-2P FM radio; Serpent P-5 engine; Paris Racing® Quiet Pipe; Associated Elfin body; Motion Graphics custom paint and graphics.

COMMENTS:

This car's design is obviously based on one or two existing models, but the mixture seems to work well. This kit may be the only one ever to make its way to the U.S., and I'm sure the Ayatollah won't want to part with it.

* not included



(Continued from page 95)
gears and two stub axles—very similar to most full-size differentials.

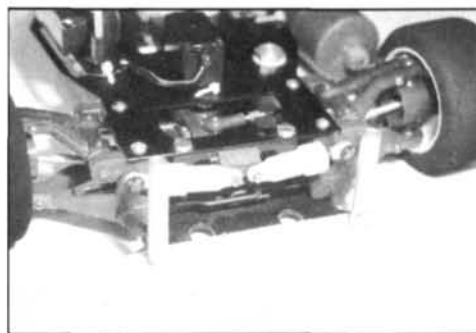
Since we didn't receive any motor mounts with the car, I was a little concerned about how the pinion set would mesh with the Mockba two-speed. The Serpent clutch bell looked similar, so I decided to use my S-Power P5 and a mild Serpent 13:16 pinion. Luckily, the chassis had just enough slots to accommodate the Serpent mounts, and the gears lined up perfectly. The Russians must have had access to Futaba* radio gear, because my S-148 servos fit perfectly in the radio-tray holes. I didn't bother to change the receiver mount

because my radio gear could be mounted directly on the Mockba. All that was left was to add the brake/throttle linkage, and the car would be ready for the track. To top the whole package off, I employed the services of Motion Graphics* to apply a first-rate American/Soviet paint scheme to the Associated* Elfin body.

MOCK TEST

My test runs with the Mockba were much less rigorous than the tests that I perform on my American cars (after all, if I

broke a part, the nearest replacement might be in Leningrad). Initially, the car understeered heavily. By



The front suspension, which is very similar to that of the World Championship BMT/Blitz car, is complete with forward-mounted shocks and torsional springs.

using the slipper unit, I tightened up the front-end drive to reach the proper overdrive ratio. This seemed to solve the understeer, but the car still didn't perform to my standards. Its longer wheelbase design seemed poor compared to the

Serpent's more maneuverable short-wheel base 6020 car. I really didn't want to mount a new set on the

original set of wheels. I decided to try my Serpent wheels on the Mockba, and they fit almost perfectly. Once the car had been fitted with some new rubber, the car handled

much better.

I doubt that the Mockba will ever be a hot item at your local hobby shop, but it's strange twist of fate that brings R/C racers on two sides of the world a little closer together. Ideology aside, there's no doubt that a country with R/C racing is surely headed in the right direction. "Dosvidaniya" to our new Russian friends, and we'll be seeing you soon at the IFMAR World Championships.

**Here are the addresses of the companies mentioned in this article:*

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.
Motion Graphics, 2645 Robert Arthur Rd., Westminster, MD 21157.
Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.
Airtronics Inc., 11 Autry, Irvine, CA 92718.
Paris Racing, 4254 Independence St., Chino, CA 91710. ■

From all angles, this car looks like the Serpent 6010 and the BMT/Blitz cars. It's no wonder that our Russian friends choose to imitate them.

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SCOPING OUT

(Continued from page 90)

As I mentioned earlier, I had some trouble with the Tamiya-style battery connectors, and since they accounted for half of this ESC's power-robbing "on" resistance, I replaced them. I prefer to use Litespeed-style battery connectors, and I usually hard-wire my motor. All this was quite easy because, even without connectors, the 408S's motor wires were long enough to reach the motor, and the wires are color-coded so there's no chance of making a mistake.

When installing an ESC, the last step is to match the controller to the transmitter-trigger travel. Following the instructions, this was a snap. I double-checked the setup with my oscilloscope and found that the LED pulse checker was very accurate. Its full "on" indication was "right on the money," so proper set-up was easy, even without the use of expensive test equipment.

With a few 6-cell battery packs (1400mAh SCRs) fully charged, I headed to the local parking lot. My Miss Piggy-driven Sideways is equipped with a B&R Bullet motor and is geared to dump in 4 minutes. I turned Miss Piggy loose, and it was instantly evident that this setup is hot. The car had enough power to "cut donuts" at a punch of the trigger, and its specialty was the power-slide turn.

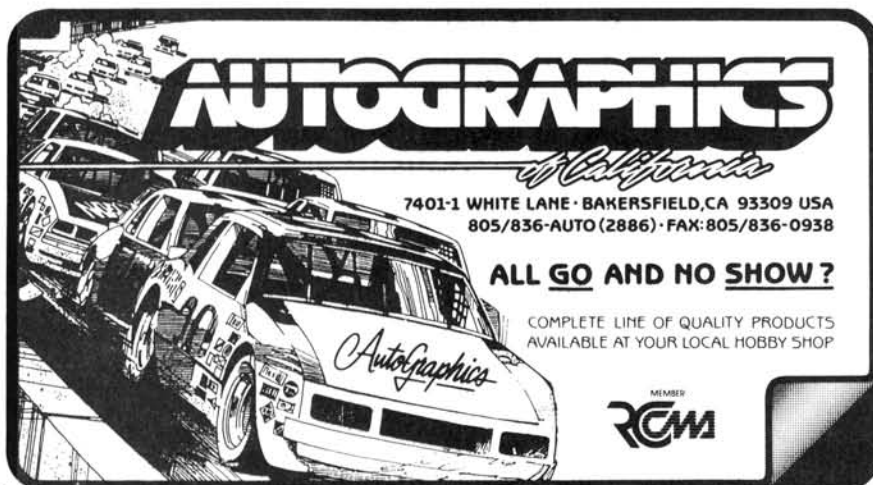
I was halfway through the first battery-pack dump when it hit me: I was driving what was supposed to be an entry-level ESC, yet it was a really hot performer. After the 4-minute run, I quickly checked to see whether the electric components were hot. The battery was warm and the B&R Bullet motor was even warmer, but the 408S was cool (hardly any heat). It's true that I was running the heat sinks and the day was quite a cool one, but I still would have expected more FET heating in a sport-style ESC.

I'm completely sold on HF controllers. Their smooth response—especially at slower speeds—is great. While running-down the charged battery packs, I played with the brakes: they were strong enough to induce James Bond-style, 180-degree sliding turns, yet, if applied with care, they were controllable and smooth.

THE BOTTOM LINE

So there it is; the 408S carries the designation "sport," but it's a lot of ESC for the money. It has a slightly higher resistance than some of its more "professional" big

(Continued on page 139)



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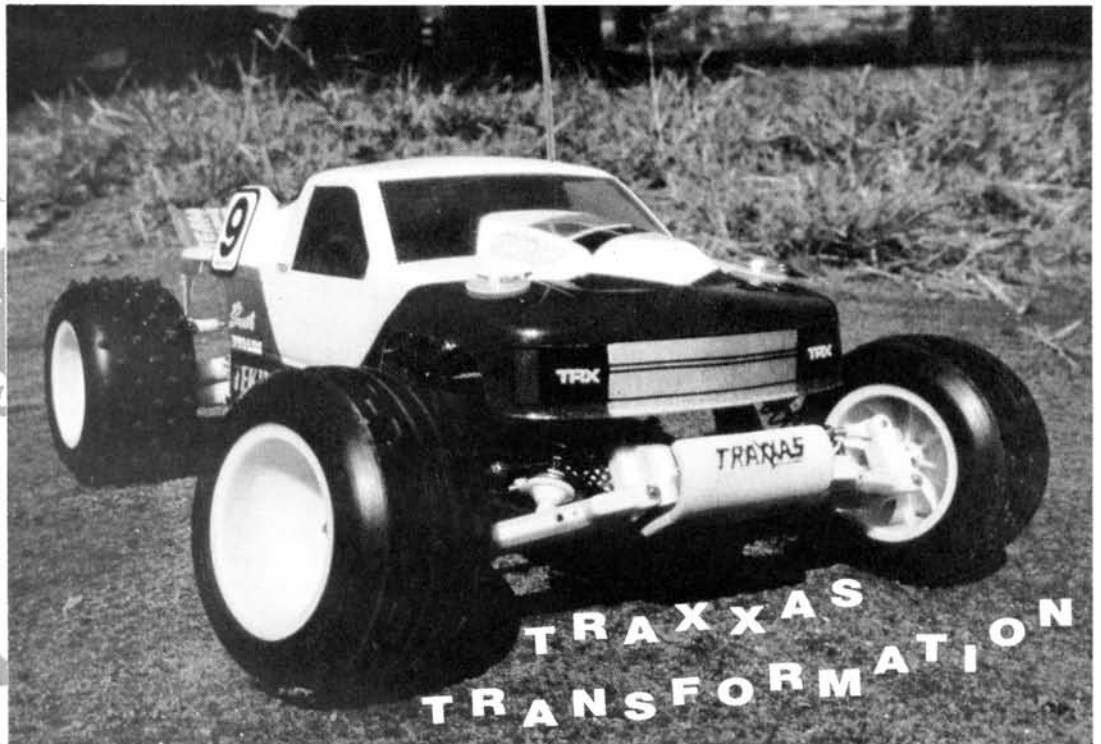
RADIO CONTROL racing has become more sophisticated, and the need to keep up with the competition has grown. The accomplishments of cars that once fulfilled our highest expectations have been dwarfed by the latest in cutting-edge technology.

Earlier car designs lasted for two or three years before becoming obsolete, but now it seems that they last only for a season or two before they're supplanted by updated or new versions. I watched the fierce competition in the racing-truck class intensify, and I knew that my Traxxas* Blue Eagle would soon reach the end of its useful existence. It was time to put some of the new technology to work for me.

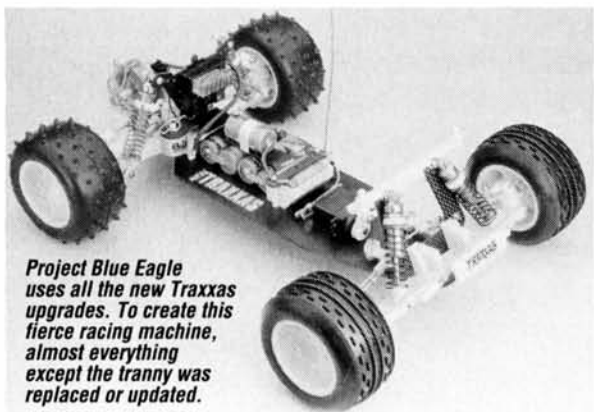
BY ALEX STROUTHOPOULOS

P R O J E C T

Blue Eagle



PHOTOS BY JOHN HUBER



Project Blue Eagle uses all the new Traxxas upgrades. To create this fierce racing machine, almost everything except the tranny was replaced or updated.

PROJECT Blue Eagle

PARTS LIST

- **Traxxas**
Graphite chassis (no. 4730)
30-degree caster blocks (no. 1932)
Offset rims (front—no. 1974; rear—no. 1972)
Black springs (no. 4651)
Rear-suspension kit (no. 1930)
Long rear shock tower (no. 4707)
Extra-long, hard-coated shock bodies (no. 4761)
Blue springs (no. 4655)
- **Litespeed**
Tuff-Stuff (no. 0175)
- **Bud's Racing Products**
Pinned diff rings (no. 2111)
Ultra Precision diff balls (no. 2135)
Transponder mount and weight (no. 5350)
Monster truck spoiler (no. 5205)
- **Tekin**
411P speed controller (no. TSC411P)
- **RCD**
Shredder mini receiver (no. RCD0020)
- **JR Propo**
4721 servo (no. 4721)
- **Pro-Line**
RED Pro-65 front tires (no. 7065)
Chevy Stadium Racer truck body (no. 3020)
- **Team Losi**
Pinion gears (no. TL-4121)
Six-row rear tires (no. A-7600)
- **Reedy**
Ultra Series Mr. R motor (no. 501)
- **Team Smooth**
7-cell Punch'd 1400mAh SCR pack (no. 3407)
- **DA Graphite**
Battery brace

BIRTH OF THE BLUES?

The Blue Eagle has its roots in the first serious racing buggy that Traxxas produced—the Bullet. Traxxas gave this car a graphite chassis, longer front suspension arms, shocks and a shock tower and a truck body; the Eagle was born. Although it

Traxxas about the parts that are available for the Blue Eagle, and I ordered what I needed. I started with a “fresh” Blue Eagle kit, and I replaced its stock graphite chassis with Traxxas’s new 100-percent graphite chassis. It doesn’t flex as much, and it’s wider, which makes

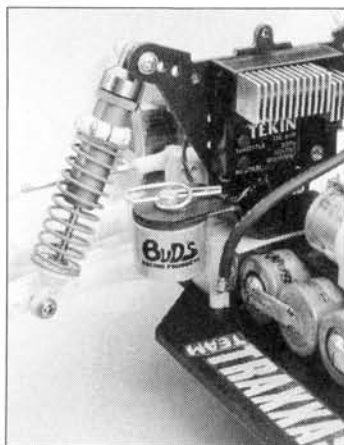
“The result? The smoothest Blue Eagle diff I’ve ever seen.”

was a hit, there were problems with the gearbox that was pirated from the Bullet. Traxxas designed a new one specifically for the Eagle, and the result was the Blue Eagle. After Tom Owens

it easier to mount the radio gear. To protect the chassis, I covered the bottom of it with Litespeed* Tuff-Stuff chassis protector.

I kept the stock front end, but I installed 30-degree caster blocks, which make the truck cut into the turns harder and increase its stability down the straights. I also used the new, shorter front axles and “dished,” offset rims. This combination positions the front wheels over the steering king-pin to reduce steering scrub. I mounted the new black springs on the stock front shocks. (Hard-coated front shocks weren’t available at the time.)

I installed Traxxas’s rear-suspension kit, which has longer A-arms and slider shafts, shorter axles and dished, offset rims. The arms are almost 1/2 inch longer, so the stock slider shafts aren’t long enough to reach each other when these arms are used. The arms limit rear-wheel scrub during suspension travel, and this makes the truck push slightly out of turns—an advantageous quality. With the longer rear arms, you must use the offset rims to bring the rear end to within legal width re-



The truck's rear suspension has many new parts: a long shock tower, extra-long hard-coated shocks with Pro springs, long A-arms and sliders and short rear axles with “dished” offset rims. Notice the Bud's Racing transponder mount.

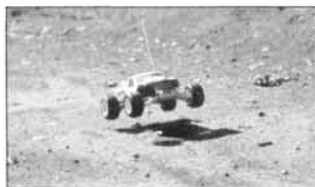
used it to win the NORRCA Modified Monster Truck Nats, it became clear that this truck was a force to be reckoned with. Now, however, the new Associated and Losi trucks have made life tough for the Blue Eagle. Project Blue Eagle is an effort to bring it up to (and above!) current racing-truck standards.

NEW WINGS

I spoke with the people at

(Continued on page 104)

PROJECT Blue Eagle



quirements. The hubs on the rims eliminate the adapters that were used on the previous Blue Eagle rims.

In the rear, I use a long, graphite shock tower and hard-coated, extra-long shocks with Traxxas blue springs. These shocks are smoother than the blue-anodized ones, and this makes the damping more consistent by reducing fric-

the diff balls and rings. The result? The smoothest Blue Eagle diff I've ever seen.

ELECTRONICS

I needed special radio gear to complement all my modifications. I chose a Tekin* 411P speed controller; it has never let me down, and I felt confident using it in the truck. To minimize weight, I installed an RCD* Shredder

Losi* six-row tires in the rear. The Blue Eagle is motivated by a Reedy* Ultra Series Mr. R 16-turn, triple-wind motor that's connected

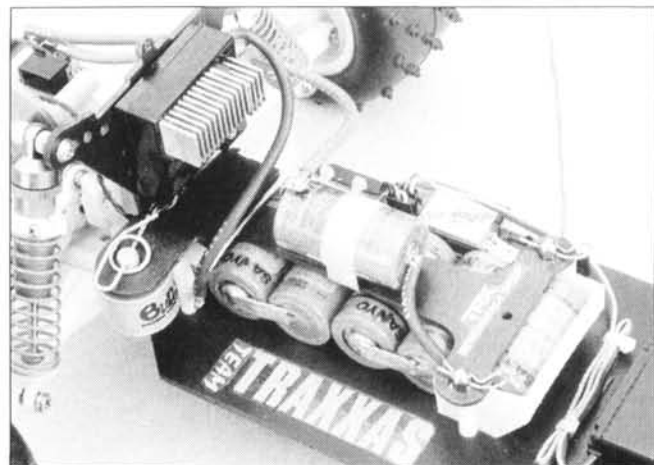
approached the long main straight, however, I opened the throttle, and my jaw dropped. This truck has some *serious* speed! I found

"As I approached the long main straight, however, I opened the throttle, and my jaw dropped. This truck has some *serious* speed!"

tion in the shock and lowering the shock oil temperature. The hard coating also prolongs the life of the critical, inner linings.

The only modification I made to the stock tranny was the addition of Bud's* pinned diff rings and Ultra Precision diff balls. I built the diff using Associated* black grease on the thrust bearing and Stealth lube on

micro receiver. It's the smallest receiver I've ever seen, and I've never had any radio hits with it! For steering, I looked through the "Racing Servo Roundup" article (February '92) before I decided on the JR Propo* 4721 servo. (It has 119 ounce/inches of torque and a 0.22-second transit time.) I use Pro-Line* Pro-65 RED tires up front and Team



The radio gear consists of a Tekin 411P ESC, an RCD Shredder micro receiver and a JR Propo 4721 servo. On the new, wider graphite chassis, there's plenty of room to mount the receiver to the side of the battery pack.

to a Team Losi pinion gear. A hot 7-cell Team Smooth* Punch'd 1400mAh SCR battery pack provides the power, and it's held in place by a DA Graphite* battery brace. Pro-Line's new Chevy Stadium Racer body tops off the truck. This setup is definitely not for the timid!

TRACK TESTING

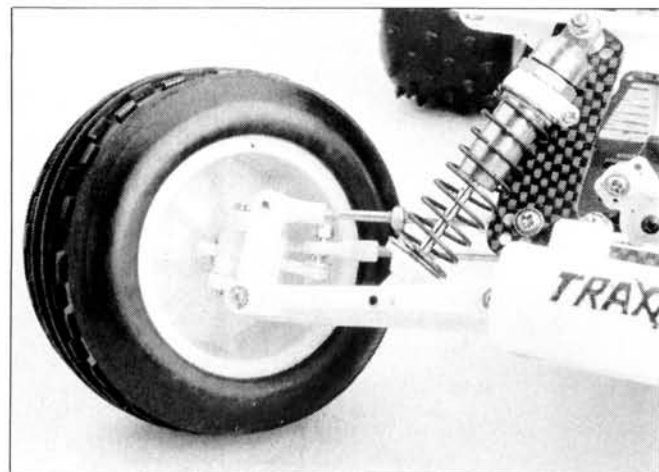
In my initial setup, I used one-hole pistons and 30WT Team Associated oil in all four shocks. I put blue springs on the rear shocks, which I had mounted in the outside hole of the shock tower. I tested the truck at the Queen's Off-Roaders track in Long Island City, NY.

I took it easy on the first lap so that I could learn the track and make sure that the truck worked properly. As I

that I could hold most of it into the sweeper turn at the end of the straight, but the truck didn't work as well on the rest of the track. I repositioned the rear shocks (using the middle hole on the shock tower), and the handling was more to my liking. I even managed to TQ and set a track record in the third heat!

Track owners John and James Lee had scheduled a trophy race for the next day, and I decided to race the Blue Eagle. (I had to see whether anyone would break my track record!) I made some driving mistakes during the qualifiers, but I managed to qualify 5th, and I was confident that I could improve that position. During the A-Main, however,

(Continued on page 170)



The front suspension uses the new 30-degree caster blocks, short front axles and dished offset rims.



JOE GACZOL HAS been really been burning the midnight oil! His last project was the "Pocket Lamborghini" (shown in the October '91 issue of *Car Action*); this time, Joe really went off on the Pocket ZZ Top Eliminator. I wonder if he has any Lilliputian blood!

Last year, Joe decided to make a '33 Ford for his brother's birthday present. Well, it became such a

project that his brother's birthday came and went before he could finish. At first, it seemed as if the Ford had less internal space than the Lamborghini had. Careful measurement revealed that it actually had more room, but it wasn't evenly distributed. This time, Joe had enough room to leave the servo case intact, but it would fit only in the middle of the car. This made setting up the steering linkage

a little tricky, but by using a brass plate that connects the two wheels and extends back toward the servo, he managed.

The motor is the same type as the one in the Lambo; it was taken from a 1/20-scale car. Joe opened the little sucker, trued the commutator, brazed-on new brushes and added ball bearings. He also milled off about 1/16 inch from one side of the motor

(Continued on page 170)

it's bad...it's nationwide

by JOHN HUBER

PARTS LIST

- Monogram 1/32-scale ZZ Top '33 Ford Eliminator
- Tekin mini-reciever
- N-size Ni-Cds (5)
- Airtronics VT2P transmitter
- Airtronics 94501 microservo
- Deans 2-pin connector
- SPDT micro toggle switch (2)
- Futaba FP-134 1/4-scale-servo circuitry
- 10A transistors (2 NPN, 2 PNP)
- .030-inch-thick fiberglass sheet
- .007-inch-thick graphite
- .060-inch-thick aluminum sheet
- .010-inch-diameter stainless-steel wire
- .75-inch-diameter Teflon rod
- .625-inch-diameter aluminum rod
- Time (lots!)

With the body removed, you can see just how much work went into the ZZ Top Eliminator. The car weighs only 5.6 ounces!



PHOTOS BY JOHN HUBER

Here, you can see the rear leaf springs, the switches for the lights and the power, and the charging jack.



Although the front end looks rather fragile, it's very strong. Notice how the brass plate connects the two wheels and is linked with the servo.

Radio Control **Racer**

**110 • Inside the ROAR
Off-Road Nats Winners**

116 • Speed Shop

120 • ROAR 1/8-Scale Nats

**127 • How to Modify Your
Futaba Attack Radio**

131 • Track Directory



Kyle Reed's Pro SE

I N S

IT WOULDN'T BE an overstatement to say that Kyle Reed has been one of the most outstanding drivers of 1991. Not only did he perform extraordinarily well at the Detroit Worlds—he finished with an impressive 3rd place in the 2WD division—but Team Losi's ace also capped off the season by sweeping the '91 ROAR Nats 2WD stock and modified classes.

Of course, Kyle's driving talent had a lot to do with his winning streak, but credit must also go to the equipment he

by FRANK MASI **EVERY RACER** who has placed a car on the starting grid has dreamed of winning a national championship. There's nothing mystical about becoming a top driver. To make the A-Main at a national event it takes immense driving skill and a thorough knowledge of chassis setup, tire combinations, and how to choose the right motors and batteries for different tracks and surfaces.

For racers who want to become national champions, the best education comes from watching the pros in action—both on and off the track. Take careful note of how the winning drivers build and tune their cars—it's a great learning experience.

used—his Team Losi* prototype JRX-Pro SE.

Designed to be the next phase of the JRX-Pro, the SE prototype (dubbed the "Double X" by Losi drivers at the '91 Worlds) is built around a version of the Junior Two's molded matrix fiber/resin

chassis. The prototype's chassis is slightly narrower, and Kyle lightened his by milling away some non-essential material.

To make the car even more "tunable" to many tracks, Kyle's car features a unique front end with a fully adjust-

able rake. Because the front bulkhead pivots on its hinge mounting, rake, i.e., kick-up, can be varied. Handmade suspension arms are attached to the bulkhead; they're extra-long (which limits wheel scrub), and they're also swept

(Continued on page 112)

THE OFF-ROAD WIRING



At the '91 ROAR Off-Road Nationals in Savannah, GA, Team Losi's Kyle Reed managed to sweep both the stock and modified 2WD classes—quite an impressive feat. In the 4WD class, Team Kyosho/Race Prep driver Mike Dunn triumphed over a virtual who's who of big-name R/C pilots to take the win.

Car Action managed to obtain both Kyle Reed's winning Team Losi JRX-Pro SE prototype car and Mike Dunn's Kyosho Lazer ZX-R so that we could give you a closer look at the equipment they used to capture national titles.

ALTHOUGH Mike Dunn races for Team Losi in the 2WD class, he can choose which car he runs in the 4WD class (Losi doesn't build 4WD cars). Mike's choice for the '91 ROAR Nats was the Kyosho* Lazer ZX-R.

The ZX-R is the latest ver-

sion of the Kyosho Lazer ZX, complete with ball diffs, a slipper clutch and longer front shocks. Mike's Lazer, however, features many Kyosho "team" parts, and a few modifications made by Mike himself.

The foundation of Mike's

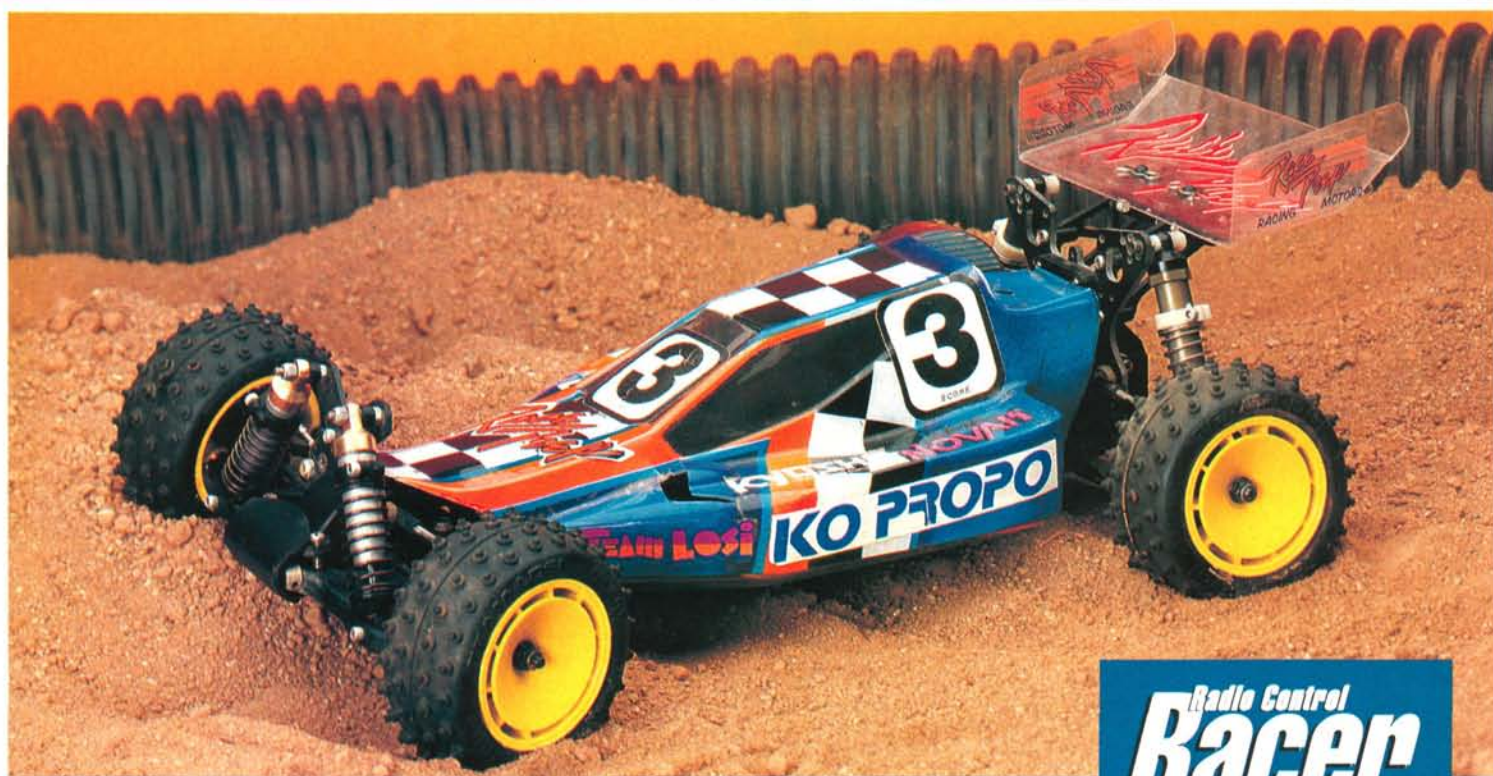
Lazer is the special chassis plate that's based on a design by Gil Losi, Jr. It's similar to the stock chassis, but it's designed to accommodate only six cells (although Mike runs seven by placing an extra cell between the two saddle-packs) instead of the seven that most

4WD cars use. The batteries are positioned slightly more forward than the cells on a stock Lazer, and this puts more weight over the front wheels. The chassis is bolted only to the back of the front diff housing to allow the housing to tilt back about 10 degrees and increase front caster.

In addition, non-essential material was removed from the chassis to make it substantially lighter. Although the overall strength and rigidity of

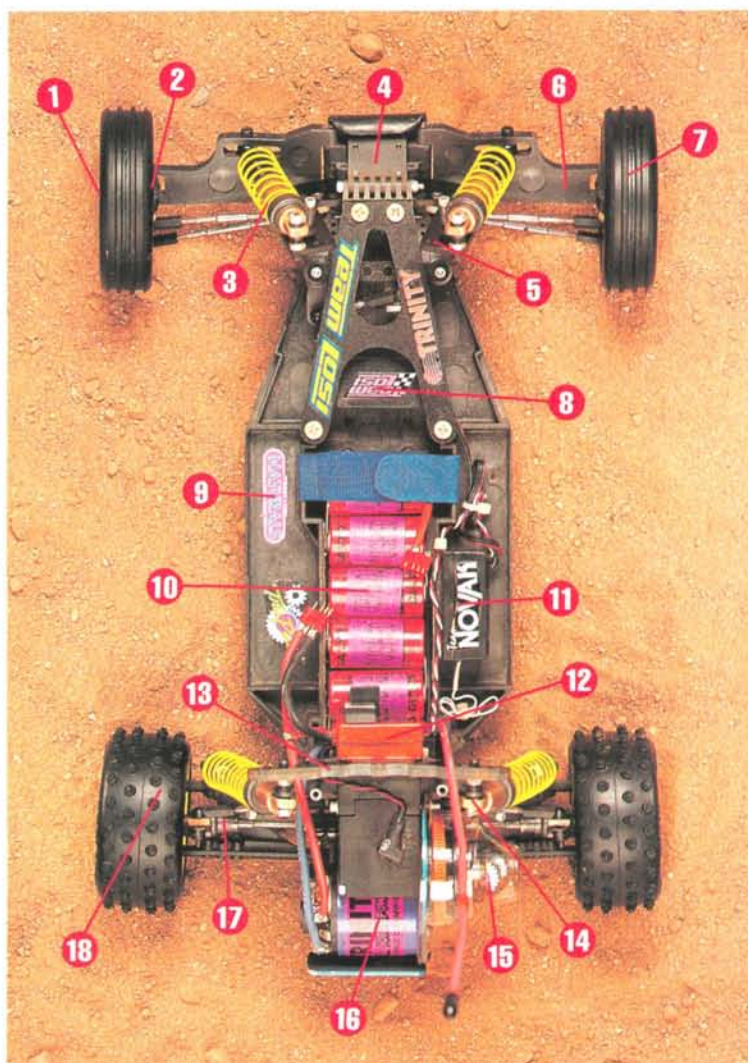
(Continued on page 113)

ROAR OFF-ROAD NATIONALS



Radio Control
Racer

- | | |
|---|--|
| 1. Special offset front rims | 10. Trinity Pushed 1400mAh SCR batteries |
| 2. Steering hubs with bearing-supported axles | 11. KO Propo receiver |
| 3. Team Losi Hard Body front shocks | 12. Novak 410-M5 electronic speed controller |
| 4. Adjustable-rake front end | 13. Custom rear shock tower |
| 5. Custom shock tower | 14. Team Losi extra-long Hard Body rear shocks |
| 6. Handmade swept front suspension arms | 15. Hydra-Drive traction control system |
| 7. Team Losi HT ribbed front tires | 16. Trinity 11-turn Chris Doseck motor |
| 8. Futaba 9401 servo | 17. MIP dogbones for Team Losi cars |
| 9. Molded matrix fiber/resin chassis | 18. Team Losi HT 4 Row rear tires |



back (which improves steering response).

The car's steering-arm setup is another interesting feature. Unlike production Losi cars, which use fixed axles with separate bearings in the wheels, Kyle's prototype uses front axles that are supported by their own bearings. The wheels themselves are bolted rigidly to the axles and the axles rotate. Apparently,

this design allows the suspension arms to extend farther into the wheel itself, widening the arm's travel radius.

The front suspension is damped by a pair of Losi's new Hard Body shocks (included on the new JRX-Pro SE). These shocks have hard-anodized/coated bodies, and are somewhat shorter than the long front shocks used on the JRX-Pro. For the Savannah track, Kyle used Losi's new

Teflon shock pistons drilled with a no. 54 bit, and filled with 35W Team Losi shock oil (a blend of 30WT and 40WT).

Kyle used prototypes of Team Losi's new shock springs, which will be designated by length and compression rate. The front springs were 2 inches long

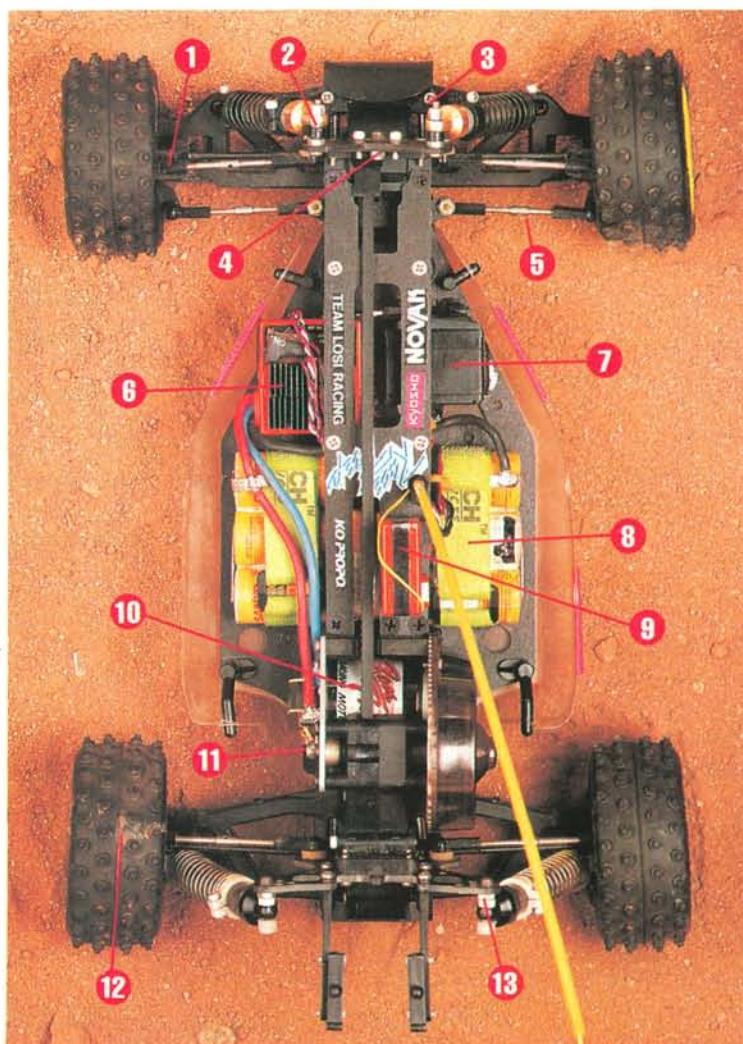
with a 3.5 rate. (They're Losi's new green springs, also included with their JRX-Pro SE.) These new shocks and springs are attached to a handmade tower that's mounted to the adjustable-rake bulkhead so that it will also pivot to match the front kick-up.

(Continued on page 114)



■ Above: a narrower, lighter version of Losi's molded Junior Two chassis is the foundation of Kyle's Nats-winning car. Power from the Trinity Pushed cells is routed through a Novak 410-M5 ESC. ■ Center: Kyle Reed's prototype JRX-Pro SE features Losi's new Hard Body shocks, which have hard-anodized/coated bodies. To experiment with different rake angles, Losi designed a fully adjustable front end. ■ Right: the front arms of Kyle's car are handmade. The unique prototype axle carriers incorporate the front wheel bearings so that a longer arm can be used.

1. Custom wheel hubs with more offset
2. Kyosho 3 1/2-inch shocks with hard-coated bodies
3. Custom-made travel limiter
4. Special "rocker" shock tower
5. Technacraft titanium tie-rods
6. Novak 410-MXc electronic speed controller
7. Airtronics 94737 servo
8. Race Prep "Nukem Power" matched 7-cell Sanyo 1700mAh SCE batteries
9. Novak NER-3FM 3-channel receiver
10. Race Prep "Y"-series 14-turn, double-wind modified motor
11. Additional ball bearing for one-way hub
12. Team Losi 4 Row HT tires
13. Team Associated hard-anodized Team shocks



the chassis has been diminished slightly, excessive flexing and twisting is held in check by the ZX-R's one-piece upper chassis plate, which joins the front and rear suspensions.

Up front, the standard ZX-R suspension, i.e., A-arms, hub carriers, and steering hubs was improved with several special Kyosho parts and a few of Mike's custom mods.

For starters, Mike widened the front end by drilling another hole in the hub carriers; this puts them

about 1/8 inch farther away from the center of the car. To accommodate this wider stance, Mike installed Kyosho's extra-long universal-joint drive shafts (normally used only in the rear). He added A&L* aluminum suspension arm mounts at both ends of the hinge pins for reinforcement, and a custom-made suspension-travel limiter that prevents the drive shafts from being

forced too far into the drive cups and bent if the car bottoms-out.

To damp the front suspension, Mike used modified Lazer ZX-R shocks that have hard-coated bodies and machined pistons. The shocks are mounted on a custom-made, two-piece tower (designed by Mike

and his brother, Steve) called a "rocker" shock tower. The top piece can pivot with chassis roll to act like a mono-shock setup (for rough tracks), but for the smooth Nats track, Mike chose to "lock up" the tower.

(Continued on page 114)



■ Above: Mike made another hole in the front hub carriers to widen the Lazer's stance and improve stability. The custom-made suspension-travel limiter is just behind the front bumper. ■ Center: Mike inserted a small ball bearing between the front wheel's one-way drive hub and its adjusting nut to reduce friction. A Race Prep modified motor powered the Lazer to its 4WD national championship victory. ■ Right: the two-piece design of Mike Dunn's special shock tower allows it to function like a monoshock setup—good for rough tracks. The front shocks have hard-coated bodies for added durability and smoothness.

Kyle Reed's Pro SE

Except for its shocks and shock towers, the rear suspension is almost identical to the one on the production Losi Pro. The rear shocks are extra-long versions of Losi's new Hard Body shocks, and, like the fronts, they have hard-anodized/coated bodies. Kyle filled these shocks with Team Losi 40WT shock oil, and he used Teflon pistons that had been drilled with a no. 56 bit. He also used prototypes of Losi's forthcoming red springs (2.5 inches long with a 2.6 rate).

The transmission is the technical highlight of Kyle's prototype SE. Although the main internal components are standard Losi pieces (with hard diff and thrust-bearing balls and a bearing-supported diff gear), the true innovation is the Hydra-Drive slipper-clutch system.

Hydra-Drive is just one component of Losi's new slipper system. The first part of the system is a standard friction-disk slipper. It's ad-

justed to be loose, so very little drive-train shock is transmitted to the tranny. Ordinarily, this would cause sluggish acceleration and limit throttle response, but with the Hydra-Drive, slippage is imperceptible.

The Hydra-Drive unit functions essentially like the torque converter on a full-size automobile's automatic transmission. It contains an impeller that's attached to the spur gear, and the spur is keyed to one of the friction slipper plates. The impeller, driven by the spur gear, spins in its reservoir housing, which contains a viscous fluid.

When a certain rpm is reached, the impeller begins to spin its housing (attached to the transmission's output shaft) "tightening" the overly loose friction slipper. It may seem complicated, but all of this happens in a very short period of time. You'd be hard-pressed to notice the initial

slippage of the friction unit, but the car would be very "locked-in" out of turns and

2WD class at the Nats were Team Losi HT ribs up front, and Losi HT 4 Row tires in the



Losi's unique Hydra-Drive slipper-clutch system is bolted to its standard friction slipper. MIP dogbones deliver smooth power from the Trinity Chris Doseck motor.

very stable over small bumps and jumps.

Kyle used a set of MIP's* dogbones for Losi transmissions instead of the molded slider-shafts. Evidently, the dogbones allow the suspension to operate with slightly less friction.

The tires of choice in the

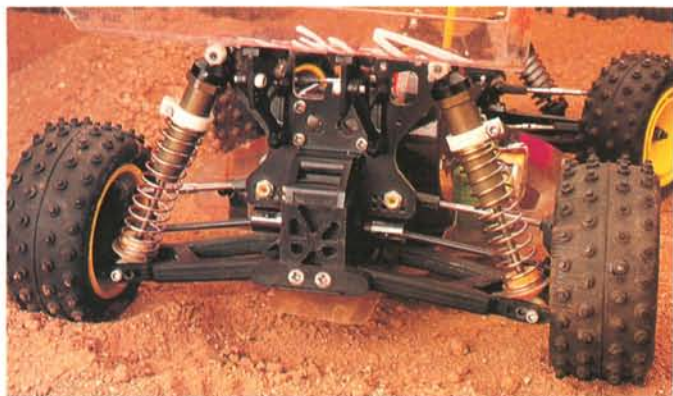
rear. Kyle used prototype molded rims up front that were offset slightly more than usual to work with his car's axles. For the rear, he used Losi's new neon yellow rims (standard on the new SE).

To win the 2WD class against some 7-cell heavy-hitters, Kyle relied on Trinity*

Mike Dunn's Lazer ZX-R

In the rear, all of the ZX-R's kit components were used, but both the suspension mount and the shock tower were made lighter by removing material wherever possible. At this level of competition, every ounce counts!

Kyosho's Gold shocks have one shortcoming: they tend to "bottom-out" a little more easily than some other types of shock absorber. To remedy this, Mike replaced the ZX-R's rear shocks with a pair of Associated's* 1.32-inch



Mike replaced the Kyosho rear shocks with Team Associated's hard-anodized shocks. Both the shock tower and the rear suspension mounts have been made as light as possible.

Team shocks.

Mike made only one modification to the stock drive system of the Lazer. The hub that drives the belt to the front differential rides on the main drive shaft by way of a one-way bearing. A small nut on the end of the shaft can be used to adjust the amount of one-way action that the front tires will have. Mike installed a small ball bearing between the hub's one-way bearing and the adjustment nut, so that the free-wheeling action was friction-free.

Mike's winning Lazer is equipped with an Airtronics* 94737 servo for sure, precise steering, and a Novak* 410-MXc high-frequency electronic speed controller. Both the servo and the ESC are fed

controlling information through a Novak NER-3FM 3-channel receiver. Horsepower for Mike's Kyosho car comes from Race Prep* "Nukem" matched Sanyo 1700mAh SCE batteries and a Race Prep modified motor that's cooled by an A&L motor-mount plate.

Mike used a pair of Team Losi* 4 Row HT tires on both the front and the rear of his Lazer, and he mounted them on Kyosho fluorescent, 2-inch, one-piece rims. He also used a complete set of Tecnacraft* titanium tie-rods for their strength and lightness. A Kyosho Optima Mid Custom conversion body with a matching protective under-tray tops off this winning machine.

Pushed 1400mAh SCR batteries. Although he only ran six cells, Kyle was able to keep pace by using a Trinity 11-turn Chris Doseck motor, controlled by a Novak* 410-M5 (yes, M5) ESC.

To control his winning car, Kyle chose a KO Propo* EX-1 radio. He kept the stock transmitter, and a Futaba* 9401 servo handled the steering.

Congratulations to Kyle Reed on his most impressive finish at the ROAR Off-Road Nationals. We'd like to thank Kyle for sending us his car for a few weeks so that we could give you an in-depth report.

**Here are the addresses of the companies mentioned in this article:*

Team Losi, 13848 Magnolia Ave., Chino, CA 91710.

MIP, 746 E. Edna Place, Covina, CA 91723.

Trinity Products, 1901 E. Linden Ave., Linden, NJ 07036.

Novak Electronics, 128-C E. Dyer Rd., Santa Ana, CA 92707.

KO Propo; distributed by Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718. ■

Congratulations to Mike Dunn on his impressive victory against some of the toughest competition in the world, and *Car Action* thanks him for allowing us to show you how it's all Dunn (sorry).

**Here are the addresses of the companies mentioned in this article:*
Kyosho/Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61824.

A&L Manufacturing, P.O. Box 2115, Corona, CA 91718.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.

Airtronics Inc., 11 Autry, Irvine, CA 92718.

Novak Electronics Inc., 128-C E. Dyer Rd., Santa Ana, CA 92707.

Race Prep, 20115 Nordhoff St., Chatsworth, CA 91311.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710.

Tecnacraft, 1335B Dayton St., Salinas, CA 93901. ■



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TEAM LOSI

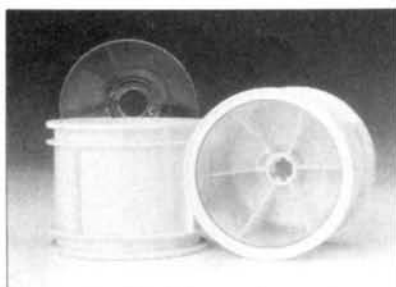
• One-Piece RC10T "Disk" Wheels

Team Losi's new, ultra-light, one-piece, RC10T wheels are similar to those used on the LX-T. Their clear exterior caps keep dirt out, and the caps can be painted to give the wheels a custom look. The wheels are available in natural (white) and neon yellow.

Part nos. A-7071 (front/natural); A-7174 (front/neon yellow); A-7181 (rear/natural); A-7184 (rear/neon yellow); A-7198 (set of four replacement caps).

Prices: \$7 (wheels); \$4 (caps).

For more information, contact Team Losi, 13848 Magnolia Ave., Chino, CA 91710.



JAMMIN' PRODUCTS

• Step Pin Rear Tires

The Step Pin—Jammin' Jay's newest addition to his line of competition tires—works very well on medium-traction surfaces, and it doesn't become caked with dirt. It made its debut in Savannah, GA, at the '91 ROAR Nats, and it created quite a stir! It fits all 2-inch wheels.

Part no. J-710

Price: \$11

For more information, contact Team Losi, 13848 Magnolia Ave., Chino, CA 91710.

PARMA

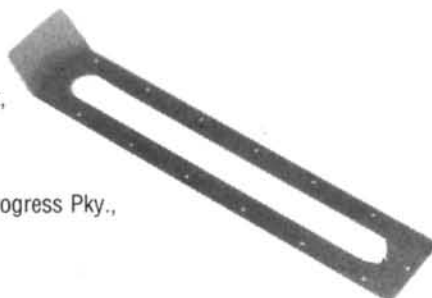
• Hot-Wrap Lexan Antenna

Decrease your car's wind drag with this light, die-cut, fluorescent, under-body Lexan antenna.

Part no. 11804

Price: \$1.75

For more information, contact Parma International, 13927 Progress Pky., North Royalton, OH 44133.



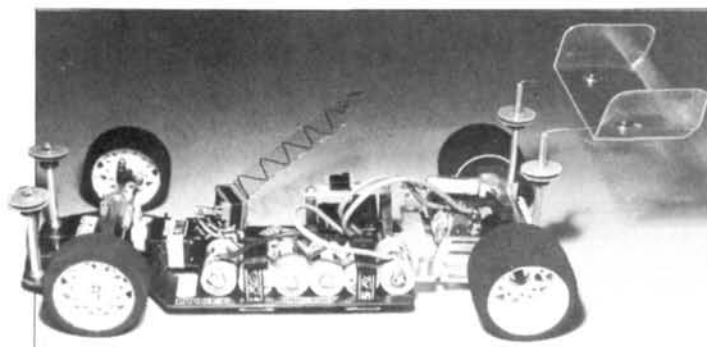
CHAMPION PRECISION BALL BEARINGS

• Ball Bearings

Most high-quality bearings will deteriorate owing to gaps between the metal shield and the inner race that let out lubricants and let in dirt. Rubber-sealed bearings offer better resistance, but the friction between rubber and metal will eventually harden the seal and cause it to crack. Champion Precision Ball Bearings offers a line of Teflon-sealed bearings in all metric and standard sizes. Teflon-impregnated fiberglass seals provide much more protection than metal or rubber, with less resistance.

For more information, contact Champion Precision Ball Bearings, 2233 Milo Dr., Palm Springs, CA 92262.

Descriptions of the products shown on these pages were derived from press releases supplied by manufacturers and/or their advertising agencies. The information given is neither an endorsement of the product by *Radio Control Car Action*, nor a guarantee of performance or safety. If you write to the manufacturer about any product described here, be sure to say that you read about it in *Radio Control Car Action*.



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Part no. MX-1003

For more information, contact McAllister Racing Inc., 1000 N. Humphreys St., Ste. 204, Flagstaff, AZ 86001.

PRO-LINE

• RC10T Stadium Bodies

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Part nos. 3020 (Chevy); 3021 (Jeep); 3022 (Nissan).

Price: \$19.95.

For more information, contact Pro-Line, P.O. Box 456, Beaumont, CA 92223.



TEAM LOSI

• Full-Radius Front Tire

The full-radius front tire was used by every Team Losi driver at the '91 IFMAR World Championships, including Kyle Reed (who made an impressive 3rd-place finish). This tire is excellent for tracks with soft dirt or very bumpy surfaces. It's wide, has an aggressive rib design and fits all 2.1-inch wheels.

Part no. A-7231

Price: \$10

For more information, contact Team Losi, 13848 Magnolia Ave., Chino, CA 91710.



PARMA

• Dampening Syrup

Extremely thick Parma Dampening Syrup can smooth out the movement in your car's rear end. It's available in 1-ounce squeeze bottles.

Part no. 18621

Price \$2.25

For more information, contact Parma International, 13927 Progress Pky., North Royalton, OH 44133.

THORP MFG.

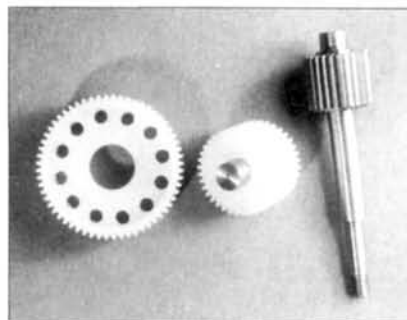
• 64-Pitch Stealth Gear Set

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Part no. 4760

Price: \$32

For more information, contact Thorp Mfg. Inc., 4054 E. Mission Blvd., Pomona, CA 91766.



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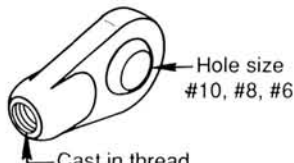


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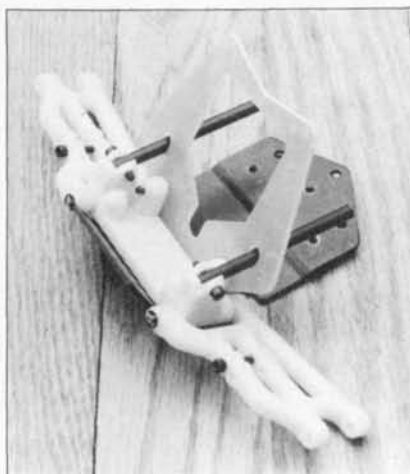
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• RC10 Team Car Front-End Kit

This is the front-end setup that Team Associated used at the '91 Worlds in Detroit, MI. It's great for very rough tracks and tight turns. The high-quality kit contains everything you'll need (except the 1.02-inch shocks and springs) to turn your RC10 into a "Worlds" car: special longer arms; a shock tower; spring cups; ball cups with Delrin balls;

and quick-adjust spring clips for the front shocks. All the injection-molded parts are made of white nylon that can be dyed.

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For more information, contact RPM Custom Engineered R/C Products, 14978 Sierra Bonita Ln., Chino, CA 91710.

TEKIN ELECTRONICS

• Smart Speed Controller

Tekin's 411K digital, computerized ESC has a microprocessor keypad. Some of its features include: programmable torque control with two time-controlled settings; a "dumple" mode; automatic dump-control circuitry; adjustable-response, spin-control brake circuitry; and a microprocessor-controlled, high-frequency circuit that produces accurate motor pulsing to give your car longer run times. No additional heat sink is required, and the receiver and the speed controller may be turned off at the transmitter.

For more information, contact Tekin Electronics Inc., 970 Negocio, San Clemente, CA 92672.



by JEFF BRONSTEIN

HOT ON THE WHEELS of an intense IFMAR World Championships came the 1991 ROAR 1/8-Scale Nationals in Cincinnati, OH. Many of the U.S. drivers, who only a few weeks earlier had charged toward the world title, were back again to vie for the national crown. Reigning champions David Campbell in 2WD, and Ralph Burch Jr. in 4WD, defended their titles against nearly 100 participants on a dangerously fast track. A roller-coaster week of on/off rain and tight qualifying ended with a surprise victory for one of racing's most enduring and deserving legends.

ASSOCIATED / DELTA

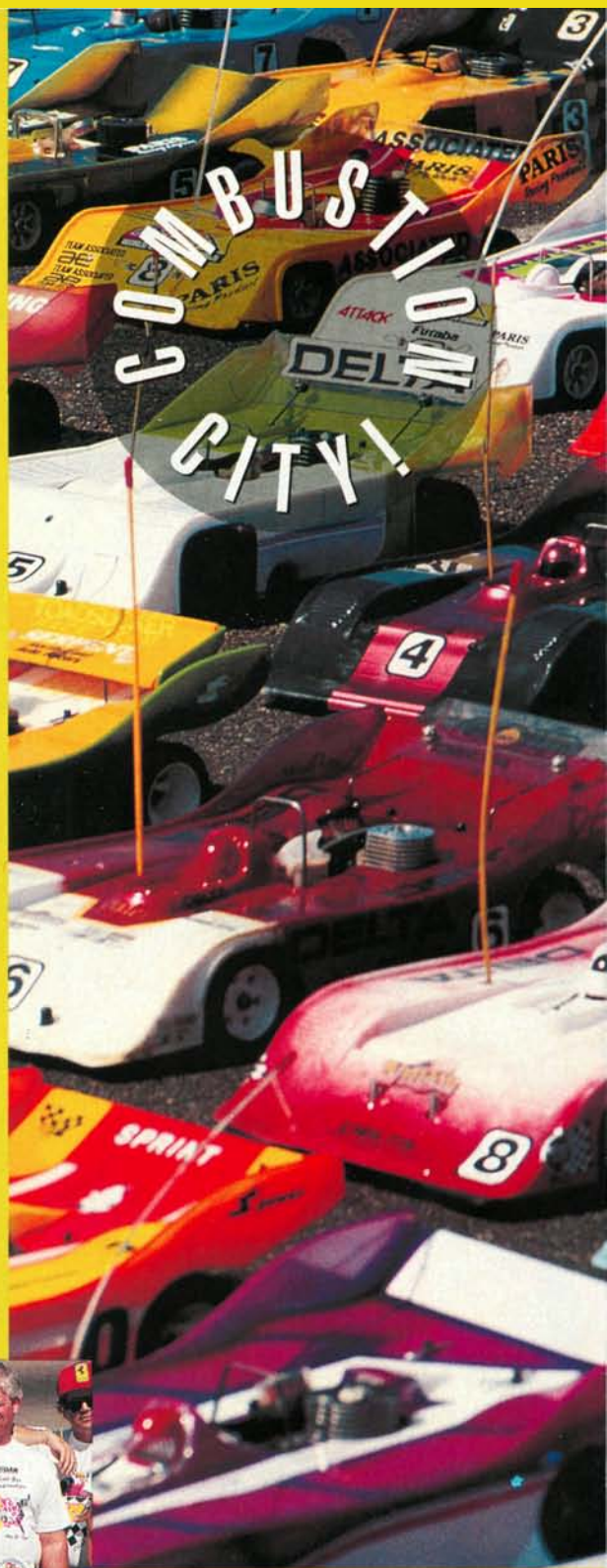
ROAR 1/8-SCALE NATS



It has been a lean season for some of 1/8-scale's 4WD top dogs. Team Associated and Paris Racing have been plagued with minor equipment failures and slight miscalculations. Associated lead driver Ralph Burch's last serious victory was almost a year ago at the Paris/Palace Station race in Las Vegas, NV. Although he led the IFMAR World Championships briefly, the failure of a radio crystal sidelined his car early in the race.

Mike Swauger, who continues to improve, has been on the verge of winning several major races, but he still hasn't brought it all together. (No one really knows just how good this kid will be.) Chuck Moon, Mark Blacketter and the rest of Team Associated, who are all integral parts of the winning machine, keep one another on their

▲ Paris Racing's new Elite motor is at the low end of the price range. (A cheap modified motor?!)



toes. But, for a team whose performance has been as consistent as clockwork from day one, this ROAR Nationals represented an opportunity to re-establish the winning attitude.

The resurgence of gas has prompted several foreign manufacturers—each with a strong desire to win the ROAR Nationals—to set up ties with new distributors in the U.S. (Many of these kits will be widely available at hobby stores soon.)



Gene Hustings readies Mike Swauger's car for the second heat of qualifying.

At the top of the list of such cars was the World Champion BMT/Blitz, which was driven by Lamberto Collari. Racer's Choice—the new importer of the BMT cars—set its sights on the title early, and RCM of Miami—importer of the well-known Serpent cars—and 2WD Winter Nats winner Willie Decker were also significant threats. Team PB returned this year with a newly updated Phoenix and a streamlined GTP look. Finally, the strong

Picco car and Art Carbonell looked better than ever. The wide variety of cars at this year's Nats undoubtedly improved the competition.

Before the race, there were coast-to-coast rumors of high tire wear and poor traction at the site. Two high-speed straights and a sweeping infield would undoubtedly compound the problem, so a soft pair of fronts might last

30 to 40 minutes at the most.

With the older, single-start, AMB lap counting system, the drag race for the first corner often resulted in a pileup. Even if

Radio Control **Racer**

ROAR 1/8-SCALE NATS

the drivers could get through cleanly, a series of switchbacks and two carousels afforded few opportunities for safe passing after that.

QUIET QUALIFIER

During the first day of qualifying there were no big surprises. Campbell and Burch set the TQ pace for the rest of the pack to follow. In 2WD, using a stock Delta P-2 and Picco power, Campbell pushed the TQ run into 4WD domain. Although not widely used in 4WD, the Delta cars are fast becoming the undisputed 2WD pace-setters. In 4WD, the qualifying times of the first 15 to 20 drivers were very close. Less than one second separated several drivers on the bubble. Before he ran out of fuel, Willie Decker (still a relative unknown in 1/8 scale) gave Swauger all he could handle for several laps; and Arturo Carbonell got into some heavy traffic, but still managed to pull off one of the top 19-lap qualifiers.

ROARING WITH RAIN

On day two, a heavy weather system moved into the area, and when it rained, it poured! Though the flood in the pits and on the track delayed the race, it couldn't dampen the racers' humor: the bottle-cap regatta was won by a sleek Dr. Pepper pop-top version of Stars 'n' Stripes (owner unknown).

When the rain had abated and the track had been found (with a depth finder!), qualifying resumed with re-

ROAR RESULTS

SPORTSMAN A-MAIN

Fin.	Qual.	Driver	Car	Engine	Radio	Laps/Time
1	1	Richard Eliezer	Associated	Rex	Airtronics	88/30:15.21
2	4	Robert Eliezer	Associated	Rex	Airtronics	81/30:00.70
3	8	Pauline Gottfried	Delta	Picco	Airtronics	80/30:07.08
4	9	Steve Friedman	n/a	n/a	n/a	74/30:20.22
5	5	Joe Hauge	Associated	Rex	Airtronics	73/30:04.67
6	7	Mike Ferrara	PB	Nova Rossi	Futaba	71/30:01.32
7	2	Glen Shreve	PB	Rossi	Futaba	64/29:17.57
8	10	Al Papp Jr.	Serpent	Rex/N.R.	Airtronics	47/30:08.91
9	11	Ernest Bauhofer	Delta	OPS	Futaba	38/30:06.44
10	6	Sal Caruso	PB	Nova Rossi	Futaba	31/13:08.85
11	3	Herschel Nelson	n/a	n/a	n/a	01/01:01.27

2WD A-MAIN

Fin.	Qual.	Driver	Car	Engine	Radio	Laps/Time
1	2	Skip Starkey	Delta	Picco	Futaba	144/45:15.05
2	7	Sean Cochran	Delta	Picco	Futaba	143/45:18.97
3	5	Bud Bartos	Delta	O.S.	KO	140/45:16.84
4	3	Brent Gottfried	Delta	Pinzini	Futaba	138/45:01.00
5	10	Jim Zwiebel	Delta	Picco	KO	138/45:09.28
6	9	Mark McCall	Delta	Nova Rossi	Futaba	134/45:02.48
7	4	Ralph Phillips	Associated	Paris/Rex	Airtronics	126/43:21.19
8	1	Dave Campbell	Delta	Picco	KO	125/45:08.14
9	6	Greg Birch	Associated	Paris/Rex	Futaba	123/45:01.09
10	8	Jeff Bronstein	Delta/Cam	Paris/Rex	Airtronics	024/09:05.65

4WD A-MAIN

Fin.	Qual.	Driver	Car	Engine	Radio	Laps/Time
1	3	Arturo Carbonell	Picco	Picco	KO	159/45:12.80
2	2	Mike Swauger	Associated	Paris/Rex	Airtronics	159/45:14.40
3	1	Ralph Burch Jr.	Associated	Paris/Rex	Futaba	154/45:15.32
4	6	Willie Decker	Serpent	TOP	Airtronics	151/45:17.96
5	8	Chuck Moon	Associated	Paris/Rex	Airtronics	150/45:16.01
6	9	Mark Blacketter	Associated	Paris/Rex	KO	148/45:03.60
7	4	Frank Calandra	Serpent	Paris/Rex	Airtronics	142/45:10.69
8	7	Gary Soltys	Serpent	Paris/Rex	Airtronics	135/45:07.04
9	5	Frank DePace	Serpent	TOP	Airtronics	129/45:09.51
10	10	Neil Vegliante	Picco	Picco	Futaba	044/17:31.12

newed fervor. In 2WD, Bud Bartos of Bud's Racing Products and Skip Starkey, ROAR 1/10-Scale National Scale Director, moved into the A-Main with two hot qualifiers. Ralph Phillips's highly modified RC500 got lots of attention when he posted the fastest Associated 2WD time. Phillips had redesigned the car's front-

and rear-suspension geometry to use Associated's new hard-anodized off-road shocks.

The 4WD crowd continued to tighten up the race for the top 10 spots. Though the top qualifiers' positions were secure, several drivers battled to the end for an A-Main run. Neil Vegliante edged out P.J. Mercik

and BMT's Mike Queller for the last position in the A-Main, leaving a very competitive B-Main lineup as well. Although nine qualifiers were originally planned, weather and other unforeseen complications curtailed the schedule to only six.



Pauline Gottfried finished 3rd in the 2WD Sportsman... ah, Sportsperson Class.

ROAR 1/8-SCALE NATS

Sportsman Class drivers made their comeback this year, with Richard and Robert Eliezer leading the way in the A-Main; but Pauline Gottfried stole the show as the only woman driver and winner in 2WD Sportsman...ah, Sports-woman!

2WD FINAL

This year, more attention was focused on the 2WD final. (Many drivers have converted their cars to 2WD in an attempt to perfect their driving skills, and the class has been gaining momentum.) At the start, it looked as if Campbell might repeat his win. He blasted off the line and led the race until nearly halfway, but his luck ran out when motor problems sidelined his P-2 several times and dashed his hopes of back-to-back wins.

Starkey didn't even apologize as he drove past and took over the lead, and Sean Cochran and Bartos helped to keep the pressure on the new leader. After only 24 laps, I was out of the race with a broken front sway bar (sabotaged by undercover operatives). Phillips began a hard charge through the pack, and this might have carried him into



Racer's Choice was on hand to promote its new BMT on-road and off-road cars.

the lead, but a handling problem destroyed his momentum. Cochran continued to pressure the leader, but Starkey drove a flawless race. With 144 laps, the winning 2WD time would easily have finished in the top 10 of the 4WD A-Main.

4WD FINAL

No description could do this incredible 4WD A-Main true justice. From the start, it was full of surprises. At the green flag, TQ'er Burch hammered the throttle, but went nowhere fast. His car spun, and the pack was halfway down the back straight before he had regained his composure. Mike Swauger took the lead and was followed by Art Carbonell, hot on his tail. As the two leaders be-

gan to pull away from the pack, Burch tried to make his way from almost dead last and get into the action. For the first 5 minutes, Carbonell paced Swauger and made no attempt to pass. As the first round of pit stops began, Swauger fueled first and Carbonell took the lead. When Carbonell pitted, almost a minute later, Swauger recovered the lead by a slim margin; and that's how it went for the entire race. The main question was whether Carbonell would be able to skip a stop and hold off both Swauger and Burch. But when Burch got back in his groove, he moved steadily through the pack into striking range, and Swauger and Carbonell could do little to ward off the National Champion as he passed them. The battle continued for 2nd and 3rd.

If there's one thing 1/8-scale racers know for certain, it's

that *nothing* is ever *certain*. Several good racers looked promising near the halfway point, but Burch stayed out in front by himself. Throughout the race, the battle for 4th was a battle among Moon, Black-ketter and Decker. As they neared the three-quarter mark, only Vegliante had retired. With 10 minutes remaining, Burch led Swauger and Carbonell by almost a lap, and the battle for 2nd was a hot one.

Suddenly, Burch looked disturbed, and he pulled his car into the pits for his final fuel stop. Ron Paris quickly inspected the car and found that, with less than 5 minutes left, Burch had no rubber left



Team Toadsucker? No comment!

on the critical front left wheel. He had literally driven the tires off his car. The rumors about tire wear had been proved true! Swauger, in 2nd, was closing fast, but he needed one last pit stop to finish the race. Meanwhile, Carbonell was ready to stretch out his fuel to the end.

On the same stunning lap—the one that could have allowed him to move into the lead—Swauger made his final, and most crucial, fuel stop. The crowd watched intently for Carbonell's car to come onto the short front straight. Just as Swauger's car emerged from pit row, Carbonell seized the lead by a two-car margin;



Willie Decker, who TQ'd in the 1/12- and 1/10-scale Stock Classes at the recent ROAR Nationals (Ranch Pit Shop), was on a roll until he met Mike Swauger in the second 4WD heat.

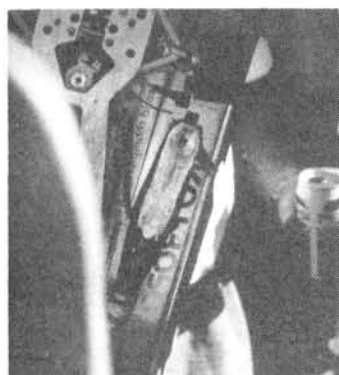
his fuel strategy had paid off! Mike battled the world champion down to the wire, but despite his efforts, he couldn't overtake the leader. Art Carbonell, world champion and R/C legend, took the checkered flag and was given



When it rained, it poured! (A wall of water washed through the pits and onto the track.) The "boat" racing was good though.

a standing ovation by the crowd of awestruck racers and spectators.

There couldn't have been a more deserving victor or a better ROAR National Championship 4WD race. Arturo Carbonell, who won his first ROAR National Championship in 1974, has yet another



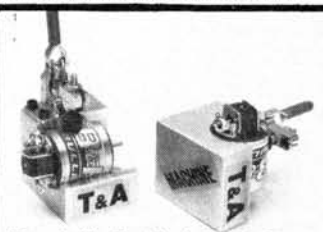
This was the result after Art Carbonell's Picco car dragged its muffler for the last few minutes of the race.

trophy for his mantle; and this year's ROAR National Championships will definitely be one of those rare events that no one ever forgets. ■

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TWO-STICK Futaba* Attack radio systems aren't exactly favored by experienced R/C enthusiasts. Their attractive prices (about \$60 for the complete transmitter/receiver/two-servo system), however, have put them in the hands of many beginners.

As they gain experience, fledgling hobbyists learn that servo-operated, mechanical speed controllers are, at best, crude and unreliable. They plan for the day when they can move up to electronic speed controllers (ESC). Unfortunately, when that happy day arrives, those who invest in Attack systems discover shortcomings in the transmitters. The less-expensive Attack 2NBL doesn't have a servo-reversing feature. (Its sibling, the 2NBR, has this feature.) When used with an ESC, the 2NBL only moves the R/C vehicle forward when the stick is pulled back.

Many frustrated young racers have rushed back to their hobby shops, where they're generally told one of two things, both of which are wrong:

- the manufacturer reversed the wires in the ESC; and
- to correct this, reverse the red and black wires on the ESC that are plugged in the receiver.

Controllers are polarity-sensitive; if a manufacturer wired one incorrectly, it wouldn't function at all. Reversing the receiver leads will cause the ESC to burn up as soon as you plug it in!

Here's another piece of misinformation: to fix a car that

runs backward, just reverse the motor leads (assuming that they're connected correctly). Yes, this will make the car run forward (for a while, anyway), but even the tamest motor is timed for forward motion. When the car moves backward, the motor runs at fewer rpm, consumes more current, overheats and enjoys a considerably shorter racing career.

HOW IT WORKS...

It's easy to make a 2NBL more compatible with most ESCs. First, start to think of the components in your car as a *system*. They work together and, if one malfunctions, it will affect the entire system. As you can see in the block diagram, you use the transmitter to generate all the control commands. *Everything starts at the transmitter.* The receiver accepts, processes and channels the information it receives from the transmitter. Although the ESC seems complex, it's really just a switch that acts only on commands from the transmitter, by way of the receiver.

The transmitter generates a series of control pulses—one for each channel, i.e., steering and speed control. The receiver snatches up these pulses, separates them and sends them to their respective destinations. The strengths of these signals can vary, but the most important feature is each

signal's duration, which is measured in microseconds or milliseconds, i.e., one-millionth or one-thousandth of a second. (Refer to the sketch of a transmitter's train of control information).

The first pulse, called the synchronizing or "sync" pulse, is long so that the receiver can differentiate it from the others. After it receives the sync pulse, the receiver begins to count. It counts the next short pulse as channel one,

and sends it to the servo. It counts the next one as channel two, and forwards it to the ESC.

Most Futaba equipment has a neutral timing of 1.5 microseconds. There's no published information regarding the length of the servo pulse excursion for this equipment, but most manufacturers aim for ± 5 milliseconds, i.e., the total pulse length will be 1 microsecond long, from 1 to 2 microseconds in time, with servo center again occurring at 1.5 microseconds. (See the sketch of the expanded

(Continued on page 128)



PHOTOS BY ELOY MAREZ

The inexpensive Futaba Attack radio system is available in two versions: the 2NBR (shown) and the 2NBL. The 2NBL doesn't have servo-reversing, and this causes problems when it's used with an ESC.

Modify your Futaba Attack

by ELOY MAREZ

Reversing your options

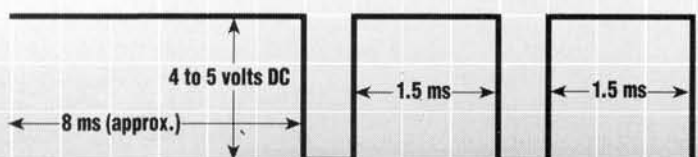
Modify your Futaba Attack

control pulse.) In high-quality equipment, the pulse length is carefully controlled to stay within those parameters. In radios such as the Attack, however, the numbers are somewhere in that neighborhood, but accuracy isn't a primary consideration.

Generally, each transmitter is different. I took some quick pulse measurements from five Attack systems. As expected, they varied greatly, but the middle readings from each of them gave me an idea of the average pulse lengths:

Datamaster into the appropriate receiver channel, it digitally displays all the pulse information while the transmitter control is being operated.

- 1** This is the information train, known as a "frame," as generated and transmitted by an R/C transmitter. The long, sync pulse starts the frame and is followed by a variable pulse for each channel in the system.



There's also an add-on radio-frequency interface that allows you to measure the transmitter directly instead of through the receiver, but this only works with

AM equipment. (Note: PCM systems transmit and receive FM; PCM is the encoding system, not the transmission mode).

TRANSMITTER TO SERVO...

With a pulse length of 1.5 microseconds, the servo will be in the neutral position, and so would a properly adjusted ESC on its channel. As the pulse length is slowly increased from 1.5 microseconds to its maxi-

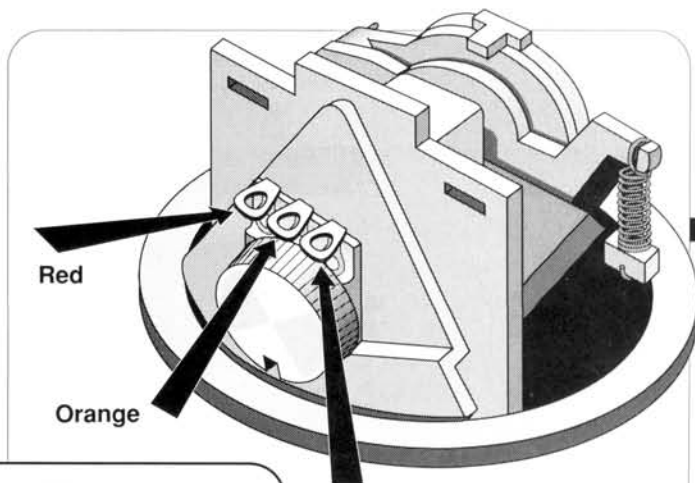
mum of 2.0 microseconds, the servo will rotate counterclockwise, and the ESC will turn the motor. If the pulse length is progressively decreased from its 1.5 microseconds neutral to its 1.0 microseconds minimum, the servo will rotate clockwise, and the ESC's braking function will be engaged.

This is all fine if the transmitter control input generates the pulse that's necessary to com-

mand the servo and/or ESC, but what if it doesn't? What if it generates a pulse that causes the ESC to operate the brake when you apply the throttle? This is where a servo-reversing switch comes into play. It reverses the pulse change in relationship to neutral after transmitter control input! (The basic—and, in this case, very important—difference between the 2NBR and the 2NBL transmitters is that the former has built-in servo-reversing.)

MODIFICATIONS

Here are some ways to make the Attack 2NBL's throttle work properly.

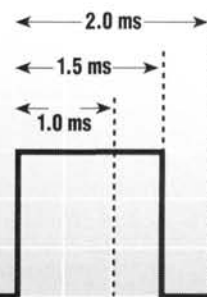


Black

This is the inside of the Attack gimbal assembly. To modify the transmitter, reverse the black and red wires. Be sure to solder carefully!

2

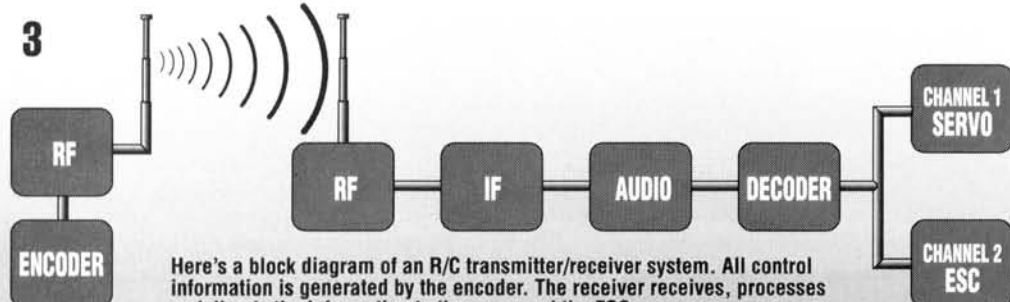
The individual pulses ultimately used to control the servo position and the ESC are optimally 1.5 microseconds long (± 0.5 milliseconds) as the transmitter control is operated.



MEASURING UP

How do you measure control pulses in thousandths of seconds? You use a \$10,000 digital oscilloscope, a \$1,000 oscilloscope (like mine), or a \$40 instrument—the Datamaster—that's offered by Ace R/C*. It's actually the easiest instrument of its kind to use, especially for those who simply want a clear picture of how their equipment works. When you plug the

3



Here's a block diagram of an R/C transmitter/receiver system. All control information is generated by the encoder. The receiver receives, processes and directs the information to the servo and the ESC.

If you're really lazy, use Ace R/C's Servo-Reverser Kit. You just plug the reverser into the receiver and either the servo or the ESC. It's as simple as that! The kit costs \$9.50 or \$14 (assembled). In either case, connectors aren't included.

If you'd rather do it yourself, remove the transmitter's rear cover, and examine the diagram of the gimbal (the assembly that holds the control sticks). Each stick is attached to a 1/4-inch metal shaft (upon which it rotates) that's part of a potentiometer (pot). If you look at the body of the pot, you'll see three lugs to which three colored wires—black, orange and red (from top to bottom)—are soldered. To reverse the control-stick action, disconnect and reverse the black and red wires as shown in the photograph.

POSSIBLE PROBLEMS

It's important to know what can go wrong, even with such a simple task as this. The Attack isn't the epitome of electronic precision, and it's possible that the original pulse (and servo/ESC) centering was way off. In this case, if you reverse the control pulse, you'll reverse the original error. If you use the Datamaster, you can determine the pulse center and adjust it to the desired 1.5 microseconds neutral by loosening the pot-shaft setscrew and rotating the shaft slightly in the appropriate direction (indicated by the pulse reading). If the error isn't great, just readjust your ESC settings and you're ready to race!

That wasn't so bad, was it? And it wasn't the speed controller's fault!

**Here are the addresses of the companies mentioned in this article:*

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.
Ace R/C, P.O. Box 511, Higginsville, MO 64937. ■

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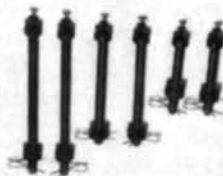
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Dixie R/C Speedway, Rt. 10, Box 210, Gadsden, AL 35901; Craig Reynolds, (205) 442-1059



"Lil" TST R/C Raceway, 32 St. N., Alabama City, AL 35904; (205) 547-0072



R/C Hi-Tech Raceway, 3303 Meridian St., Huntsville, AL 35811; Rick Chambers, (205) 539-1347



Satellite Hobbies, 2799 Rose Rd., Albertville, AL 35950; Troy or Jerry Smith, (205) 878-2526



ALASKA

McKinley Hobby & Raceway, 2300 McKinley Dr., Wasilla, AK 99654; (907) 376-9351



Southtown Hobby & Raceway, 12001 Industry Way #2, Anchorage, AK 99515; Bob or Vickie Peters, (907) 345-3131



ARIZONA

Economy One-Stop Raceway, 4000 S. 4 Ave., Yuma, AZ 85366; (602) 344-3514



Overmyer's Speedrome, P.O. Box 541, Bullhead City, AZ 86430; Sarge Overmyer, (602) 758-2463



R/C Sports Mania, 3550 N. 35th Ave., Phoenix, AZ 85028; (602) 272-3165



Scale Racing Sports, 1120 N. Hayden Rd., Tempe, AZ 85281; Mike Dolan, (602) 829-9117



ARKANSAS

AERCC, Vimy Ridge Rd., Little Rock, AR; (501) 945-7037



Arkansas Int'l. Superspeedway, Rt. 4, Stokes Rd., Pine Bluff, AR 71602; (501) 247-1488



R-C Wheelz, 2630 Piko Ave., N. Little Rock, AR 72114; (501) 758-3330



CALIFORNIA

ARO Hobbies Raceway, 24275 Sunny-mead, Moreno Valley, CA 92553; George or Mike Killeen, (714) 924-3240



Bob & Jim's R/C World, 3485 University Ave., Riverside, CA 92501; (714) 684-6314



Brake-a-way Raceway, 3179 Hamner Ave., Norco, CA 91760; Debbie Burrie, (714) 736-6063



California Auto Racers (CAR), 96 San Tomas Aquino Rd., Campbell, CA 95008; (408) 749-9751



City Speedway, 7750 Convoy Ct., San Diego, CA 92111; (619) 560-9633



D&D Raceway, 290 S. First St., Turlock, CA 95380; Dave Miller, (209) 667-0970



Desert R/C Raceway, 39360 3rd St. E., Ste. 305, Palmdale, CA 93550; (805) 272-1835



Fast Eddie's R/C Raceway, 3261 Edward Ave., Santa Clara, CA 95054; Eddie Aflague, (408) 986-8256



Fast Lane, 25845 San Fernando Rd., #21, Saugus, CA 91350; (805) 255-2404



Frogdown R/C Raceway, Motherlode Hobbies, 3069 Hwy. 49, Angels Camp, CA 95222; (209) 736-4989



Hobbycrafters Raceway, 323 Five Cities Dr., Pismo Beach, CA 93449; (805) 773-6765



Hobbytown USA Raceway, 4006 Foothills Blvd., Ste. 101, Roseville, CA 95678; Mike Galloway, (916) 773-5062



Jackman's R/C Raceway, 1616 N. Beale Rd., Marysville, CA 95901; Bonnie or Harry Jackman, (916) 741-3744



K&M R/C Raceway, 22474 A Barton Rd., Grand Terrace, CA 92324; Mike Blake, (714) 783-0899



Lindsey's R/C Raceway, P.O. Box 443, Doyle, CA 96109; (916) 827-2457



Lucerne Valley R/C Raceway, P.O. Box 2047 Lucerne Valley, CA 92356; Frank Rodrigue, (619) 248-7305



M'n'M Hobbies, 710 E. Parkridge, Ste. 102-106, Corona, CA 91719; Richard Trujillo, (714) 272-3545



One-Stop Raceway, 3782 Cerritos Ave., Los Alamitos, CA 90720; (213) 493-7597



Outlaw R/C Hobbies, 7920 Webster, San Bernardino-Highland, CA 92346; Rick James or Paul Nadeau, (714) 864-1770



Paso Robles R/C, P.O. Box 3795 (3980 Linne Rd.), Paso Robles, CA 93447; (805) 237-0624



The Race Place, 13564 E. Imperial Hwy. Unit G, Santa Fe Springs, CA 90670; (213) 926-7711



Radio-Controlled Hobbies, 2011 Placentia Ave., Costa Mesa, CA 92630; (714) 631-1555



R/C City Raceway & Hobbies, 1453 N. Milpitas Blvd., Milpitas, CA 95035; Tom & Bonnie Grader, (408) 262-3188



R/C Racing Center, 9842 Channel Rd., Lakeside, CA 92040; (619) 443-2270



R/C Sports, 1009 Alamo Dr., Vacaville, CA 95688; (707) 446-5555



R/C World, 5759 E. Fountain Way, Fresno, CA 93727; Brian Gaynor, (209) 348-9409



Robin's Racing World, 1844 W. Glenoaks, Glendale, CA 91201; (818) 240-2093



Roy's Raceway, 368 E. 11th St., Tracy, CA 95316; (209) 836-3513



San Diego R/C Car Club, P.O. Box 232456, San Diego, CA 92193; (619) 560-0089



Square Roundhouse R/C Speedway, 1468 Lander Ave., Turlock, CA 95380; (209) 668-4454



SRS Raceway, 915 N. Main St., Salinas, CA 93906; (408) 424-4044



Trains, Planes, Automobiles, 1260 Oddstad, Redwood City, CA 94062; (415) 365-7500



Tyler's RC/RD Racing Center, 6865 Flanders #D, San Diego, CA 92121; (619) 597-3072



White Mountain R/C Raceway, 174 West Line, Bishop, CA 93514; (619) 872-1599



Yorba Linda R/C Speedway, 3780 Prospect #B, Yorba Linda, CA 92686; David Landier, (714) 572-2175



COLORADO

Action R/C Raceway, 4939 N. Broadway #57, Boulder, CO 80304; (303) 440-0330



Colorado R/C Speedway, 6520 Wadsworth Blvd. #130, Arvada, CO 80003; (303) 425-1718



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Hot Lap Hobbies & Raceway, 4206 Wadsworth, Wheat Ridge, CO 80034; Phil Cotter, (302) 420-3051



MHOR R/C Raceway, 15540 E. Batavia Dr., Aurora, CO 80011; Jess Brockman, (303) 343-0151



R/C World & Track, 2788 S. Federal Blvd., Denver, CO 80236; (303) 789-0838



CONNECTICUT

Connecticut R/C Off-Roaders, Old Field School, Mona Terrace, Fairfield, CT 06430; Mike Belmonte (203) 661-0145



East Hartford R/C Speedway, 52 Village St., East Hartford, CT 06108; Bob Matulis, (203) 528-8566



High-Tech Raceway, 374 Enfield St., Enfield, CT 06082; (203) 745-8488



Hobby World Raceways, 161-6 Woodford Ave., Plainville, CT 06062; (203) 793-1111



K/N R/C Speedway Inc., West St., Stafford Springs, CT 06076; (203) 684-9896



R/C Madness, 640 Enfield St., P.O. Box 64, Enfield, CT 06082; Christopher Marcy, (203) 741-6501



R/C Raceways Inc., 1265 John Fitch Blvd., South Windsor, CT 06074; (203) 528-3661



R/C World/Sugar Hollow Speedway, 66 Sugar Hollow Rd., Danbury, CT 06810; (203) 748-2185



SCORA/Clayton's Off-Road Racing, 141A Middletown Ave., North Haven, CT 06473; Craig or Keith, (203) 234-CLAY



Wallingford Indoor Racing, 63 N. Cherry St., Wallingford, CT 06492; (203) 265-3939



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TNT Raceway, Alt. 13 South, Seaford, DE 19973; (302) 628-0520



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B+T R/C Central, 811 Playground Rd., Ft. Walton Beach, FL 32547; (904) 863-2666



Barry's R/C Raceway, 2701 SW College Rd. #603, Ocala, FL 32674; Barry Lees, (904) 237-4400



Branford R/C Speedway, Rt. 3, Box 240, Branford, FL 32008; (904) 935-0758



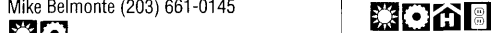
Continental Racing, 5335 N. Military Trail, West Palm Beach, FL 33407; (409) 697-5167



Coral Springs Roadrunners, P.O. Box 9632, Coral Springs, FL 33075; Tom Allison, (305) 721-0344 or Rick Schwartz, (305) 344-1983



5-fifty-5 Raceway, County Rd. 555, Bartow, FL 33830; Chuck Nolke, (813) 324-7406



Ft. Lauderdale Speedway, Mills Pond Park, 2201 NW 9th Ave., Ft. Lauderdale, FL 33311; Jack Koons, (305) 424-6617



Greater Orlando Auto Racers, 960 Keller Rd., Altamonte Springs, FL 32779; Dave Mottin, (407) 293-7090



H&H Raceway, 4121 S. Tamiami Tr., Sarasota, FL 34231; (813) 922-7711



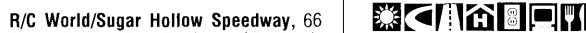
Hialeah Hobby Raceway, 4562 W. 12 Ave., Hialeah, FL 33015; (305) 826-3702



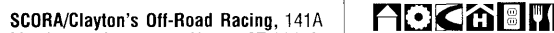
JARCAR Raceway, 7273 103rd St., Jacksonville, FL; Rob Kruse, (904) 272-6315



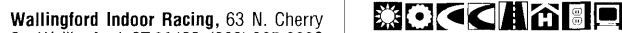
Lake Whipoorwill International Speedway, 12345 Narcoossee Rd., Orlando, FL 32827; Bob Hosch, (407) 277-9586; fax (904) 759-3993



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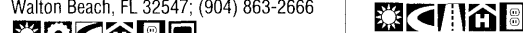
Ocean Side Raceway, 206 E. Eau Gallie Blvd., Indian Harbour Beach, FL 32937; Michael Kelly, (407) 779-0312



PBG R/C Motor Park, 4399 Lilac St., Palm Beach Gardens, FL 33410; (407) 624-9252



Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615



Raceway Hobbies, 1115-J Enterprise Court, Holly Hill, FL 32117; (904) 258-7537



Ray's Track & Hobby, 4605 W. Cayuga St., Tampa, FL 33614; (813) 872-8662



Rental Raceway, 3655 S. Hopkins Ave., Titusville, FL 32780; (407) 383-0631



River City R/C Car Club, 9711 Sharing Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948



St. Augustine R/C Speedway, 99 Masters Dr., St. Augustine, FL 32095; (904) 824-6357



South Dade Speedway, 25520 1/2 SW 141 Ave., Princeton, FL 33032; John Cocker, (305) 247-4127



Space Coast Raceway, 563 Barton Blvd., #17, Rockledge, FL 32955; Bill Pinch, (405) 631-4373



Sun Valley Speedway, Palmer Blvd., Sarasota, FL 34232; (813) 322-1200; (mailing address: Rt. 1, Box 443N, Myakka City, FL 34251)



West Coast R/C Club, Lake Park, 8607 May Cr., Tampa, FL 33614; (813) 932-3650



Wilbur Avenue Raceway, 1848 Wilbur Ave., Vero Beach, FL 32960; (407) 567-1200



GEORGIA

Case R/C Raceway, P.O. Box 1061, Trenton, GA 30752; (404) 657-6789



Dalton Raceway, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 226-6699



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Good Life City Raceway, 6606 Newton Rd., Albany, GA 31707; (912) 888-2515



Lake Mayer Raceway, 1 Melinda, Savannah, GA 31460; Phil Hurd, (912) 355-6033



Peach Bowl R/C Speedway, 2035 Westside Ct., Snellville, GA 30278; (404) 985-1448



The Racer's Edge, 1530 Hwy. 19 North, Thomaston, GA 30286; Mark or Roger Walls, (404) 648-6534



Sandy Cross Speedway, Rt. 1, Box 1073, Royston, GA 30662; Morris Phillips or Wayne Fowler, (404) 245-9573



Silver Wings Raceway, 5611 Riverdale Rd., College Park, GA 30349; (404) 991-2225



HAWAII

Team PRC Racing Club, Pahoa Government Rd., Pahoa, HI 96778; Charlie Kawamoto, (808) 965-8216



IDAHO

Falls Hobbies & R/C Raceway, 1515 Northgate Mile, Idaho Falls, ID 83401; (208) 529-8650



ILLINOIS

Adam's Blast Track, RR 1, Box 370, Ashmore, IL 61912; John Deffenbaugh, (217) 349-8447



Ameri-Trac, R3, Box 242, Mattoon, IL 61938; (217) 234-8707



Badlands II, 320 W. Jackson St., Vandalia, IL 62471; (618) 283-2913



BARR, 809 River Dr., Byron, IL 61010; Jim Haynes, (815) 234-5615



Central R/C Raceway, RR 2, Box 51-A, Carlinsville, IL 62626; Tim Stewart, (217) 854-9718 or Don Rice, (217) 854-3785



Eagle Speedway, 303 N. Plum, P.O. Box 774, Pontiac, IL 61764; Joe or Vickie Bachman, (815) 842-1738



Ebbtide Hobbies & Raceway, 865 N. Main St., Antioch, IL 60002; Jim Schaefer, (708) 395-8433



Hobby Town Raceway, 4915 W. Rt. 120, McHenry, IL 60050; Mike Hollingsworth, (815) 344-1777



JC Hobbies/Metro Motor Speedway, Metropolis Airport, Metropolis, IL 62960; (618) 524-9979



JMP Raceway, 952 Harrison Ave., Wood River, IL 62095; (618) 258-0297 or -0282



Leisure Hours Hobbies, 2872 Plainfield Rd., Joliet, IL 60435; (815) 439-1477



Lisle Community Park Raceway, 1825 Short St., Lisle, IL 60532; Jim Bernicky, (708) 416-6944



Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61111; (815) 282-1311



Magnum R/C Speedway, RR #2, Box 399, Danville, IL 61832; Terry & Nancy Dines, (217) 446-2472



Marty's R/C Hobby, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441



Midwest Hobby Trax, 114 Kirkland Cr., Unit A, Oswego, IL 60543; Duane Pierson or John Koonce, (708) 978-RACE



Monee R/C Raceway, 26049 Ridgeland Ave., Monee, IL 60449; (708) 534-2422



Precision Speedway, 3919 17 St., East Moline, IL 61244; Dan Kennedy, (309) 796-2226



Radio Active Raceways, 751 N. Bolingbrook Dr., #15, Bolingbrook, IL 60440; Jim or Lenny, (708) 759-7557



R/C Speed Zone, 1400 E. Lafayette, Bloomington, IL 61701; (309) 662-RACE



Redline Raceway, 921 Harding, Calumet City, IL 60409; (708) 862-8181



Rick's R/C Raceway, 122 W. 12th St., Streator, IL 61364; Rick Wallace, (815) 673-1870



Rockford Scale Raceway, 6400 N. 2nd St., Loves Park, IL 61111; Sam Stroud, (815) 765-2970



Rockford Scale Raceway, 6900 N. 2nd St., Machesney Park, IL 61111; (815) 765-2970



SIRCAR Raceway, 1200 North Marion, Carbondale, IL 62901; (618) 549-5885



Slot Wing Hobbies Race Place, 1615 W. Springfield, Champaign, IL 61821; (217) 359-1920



Smithton Community Park, P.O. Box 8152, Belleville, IL 62221; (618) 236-7569



Superior Raceway, 1706 W. Bradley, Champaign, IL 61821; (217) 359-8073



Thunderroad Speedway, 4 E. Division St., Coal City, IL 60416; Al Cooley, (815) 634-8184



Valley Farms R/C Raceway, 706 Bypass 20, Cherry Valley, IL 61016; (815) 332-4516



INDIANA

BJ's Riverside Raceway, 265 S. Clay St., Jasper, IN 47546; Joe Lorey, (812) 482-3484



Blaze'n Race'n, P.O. Box 6, Hamlet, IN 46532; James Berndt, (219) 867-1324



Boone County R/C Track, 1300 E. 100 S. Rd., Lebanon, IN 46052; Jerri Moss, (317) 293-2225



CC Hobby & Speedway, RR 1, Box 68, Francesville, IN 47946; (219) 567-2447



Classic Hobbies, 420 E. Commercial, Lowell, IN 46356; David Scheffler, (219) 696-0649



County Line R/C, 2333 W. State Rd. 38, Sheridan, IN 46069; Greg Welch, (317) 758-6393



Gonzo Raceway, 418 Roberts Rd., Chesterton, IN 46304; (219) 980-8409



Hobby Barn Raceway, 1950 Springhill, Terre Haute, IN 47802-9694; (812) 299-5773



Hobby World Raceway & Hobbies, 1508 N. Harlan, Evansville, IN 47711; Jeff Wassman, (812) 421-1100



K&L Hobbies, 7 Raceway, 2751 N. State Rd. 39, La Porte, IN 46350; (219) 324-0353



Master Hobbies, 8501 Bash Rd., Indianapolis, IN 46250; Tim or Dan, (317) 576-1961



Mooresville R/C Hobby, 7 Moore St., Mooresville, IN 46158; (317) 831-8877



Mooresville R/C Hobby, 9201 S. State Rd. 67, Camby, IN 46113; (317) 831-8877



PITT, 1244E 700N, Ossian, IN 46777; (219) 622-4591



Raceway Park, 919 E. McKinley, Mishawaka, IN 46545; Bob Bean, (219) 256-1020



Radio Car Craft, 1925 S. Curry Pike, Bloomington, IN 47403; (812) 332-3245



R/C World of Indiana, RR #2, Box 335, Lynn, IN 47355; (317) 874-2464



Runway Hobbies Raceway, 5342 Elmwood, Ste. J, Indianapolis, IN 46203; Randy Hyatt, (317) 784-2421



IOWA

Kodiak Race Track, Box 78, Okoboji, IA 51355, Brad or Dave, (712) 332-7982



Mr. Car Raceway, Central Iowa Fairgrounds, Marshalltown, IA 50158; (515) 483-2234



North Park R/C Speedway, 805 S. Jerome, Algona, IA 50511; (515) 295-9352



Plymouth County R/C Speedway, 4th Ave. NE (Plymouth County Fairgrounds), LeMars, IA 51031; (712) 546-8788 or 546-9522



Power House Racing, 1200 S. Division St., Creston, IA 50801; (515) 782-4582 or 782-4174



River City R/C Speedway, 317 2nd NW, Mason City, IA 50401; Leonard Johnson, (515) 423-7333



Rotunda Raceway, 101 Bass, RR 1, Box 155A, Storm Lake, IA 50588; (712) 732-4555



Sibley Raceway, Osceola County Fairgrounds, Sibley, IA 51249; Al Reck (712) 754-2604 (day) or 754-3613 (night)



Southwest Iowa R/C Raceway, Kelly Park, Red Oak, IA 51566; (712) 623-5513



Southwest Iowa R/C Raceway, Montgomery County Fairgrounds, Red Oak, IA 51566; (712) 623-5513



Team Johnson Speedway, Jct. Hwy. 34 & 406, West Burlington, IA 52655; (319) 753-0753



KANSAS

ACE Raceway, 325 Commercial, Emporia, KS 66801; Luke Amend, (316) 343-1933



Chad's R/C World & Raceway, 217 Brownie Ave., P.O. Box 76, Scranton, KS 66537; (913) 793-2313



Ebersole R/C Superspeedway, 11417 W. Hwy. 54, Wichita, KS 67209; Len Ebersole, (316) 722-8888



Pittsburg International Mini Speedway, 511 1/2 N. Locust, Pittsburg, KS 66762; (316) 232-1973



R/C Superdome & TQ Pro Shop, 14 E. Ave. A, Hutchinson, KS 67501; (316) 665-6633



Shawnee Hobby & R/C Raceway, 4603 Shawnee Dr., Kansas City, KS 66106; Bill Rugh, (913) 384-3211



KENTUCKY

Bluegrass Int'l/Perry's R/C Hobbies, 214 Globe St., Radcliff, KY 40160; William Perry, (502) 351-RACE



East Kentucky Hobby Raceway, Hwy. 15 Garner Mt., Isom, KY 41824; (606) 633-8567



KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Automatic lap-counting
- Food available

Track Directory

Fast Lane Hobbies, 6132 Scottsville Rd., Bowling Green, KY 42104; (502) 782-2419



Hobby Center Inc., 2106 Triplett St., Owensboro, KY 42303; Bobby Howell, (502) 683-7611



Hobbys Plus, 819 Main St., Hazard, KY 41701; Joe Mavaro, (606) 436-3175



The Lexington Autodrome Raceway, 2753 Richmond Rd., Lexington, KY 40509; (606) 269-7794



Remote-Control Hobby Shop/Raceways, Rt. 8, Box 211, Mayfield, KY 42066; (502) 247-4715



River Cities Raceworld, 1104 Powell Ln., Flatwoods, KY 41139; (606) 836-CARS



West Kentucky R/C Cars, 45 Hawkins Loop, Symsonia, KY 42082; (502) 851-3534



LOUISIANA

Acadiana R/C Hobbies & Raceway, 120 Toledo Dr., Lafayette, LA 70506; (318) 235-5825



Cajun R/C Raceway, Rt. 2, Box 288 Hwy. 343, Church Point, LA 70525; (318) 873-3855



Hobby Shop Track, 110A Darbonne, Sulphur, LA 70663; (318) 527-9129



Oakdale Raceway, 1259 Hwy. 165 S., Oakdale, LA 71463; M.L. Jeziorski, (318) 335-3532



MAINE

Central Maine R/C Speedway, 18 Lithgow St., Winslow, ME, 04901; David Prescott, (207) 877-2232



Rocket R/C Hobbies, Annabessacook Rd., Winthrop, ME 04364; (207) 377-6910



Sanford Speedway, 479C Elm St., Biddeford, ME 04005; (207) 282-8838



Team Terminator Off-Road Track, c/o Hobbies Plus, 479C Elm St., Biddeford, ME 04005; (207) 282-8838



The Racers' Club, 85 Hubbard Rd., Berwick, ME 03901; (207) 698-5337



MARYLAND

ABC Raceway, 2825 Ocean Gateway, Cambridge, MD 21613; (301) 228-4291



Doug's Hobby Shop Raceway, Rt. 301N, Box 32B, Waldorf, MD 20601; (301) 843-7774



40 Speedway, 933 Pulaski Hwy., Havre de Grace, MD 21078; Doug, (301) 538-3135



Friendship Off-Road Racers, 1531 Florida Ave., Severn, MD 21144; (301) 551-3050



GPA Speedway, 3498 Crain Hwy., Bowie, MD 20715; George Cole, (301) 805-9004



Off-Road Headquarters Indoor Raceway, 5640 K Sunnyside Ave., Beltsville, MD 20705; (301) 474-1246



Radio Control Cars, Inc., 13600-A Annapolis, Bowie, MD 20715; Paul Fauth, (301) 262-1444



Suzie Goose Hobbies, 718 E. Gude Dr., Rockville, MD 20850; (301) 279-2966



MASSACHUSETTS

Archer's Lane R/C Raceway, 11B Washington St. (Rt. 1), S. Attleboro, MA 02730; (508) 399-6762



Centerline Hobbies, 167 Corporation Rd., Hyannis, MA 02601; (508) 771-1244



CKS Raceway, 46 Wilbraham St., Palmer, MA 01069; (413) 283-2260



Megadrome Raceway, N. Adams Plaza, Rt. 8, North Adams, MA 01247; (413) 743-7223



Mike's Speedway, Rt. 9, Mt. Farms Mall, Hadley, MA 01035



Naytrix Raceway, Holmes Rd., Pittsfield, MA 01201; Rick Welch or Nate Zuckerman (413) 443-2488 or 443-9886



R/C Hobbies & Speedway, 1311 Purchase St., New Bedford, MA 02740; (508) 991-5040



West St. Hobbies, 114C Main St., Medway, MA 02053; (508) 533-1231



MICHIGAN

Baja Bayou Off-Road Raceway, 5313 W 22 Mile Rd., Tustin, MI 49688; (616) 829-3447



Bill's Raceway, 7126 Pardee, Taylor, MI 48180; Bill Rollins, (313) 291-6238



Can-Am Hobbies Speedway Park, 1148 Gratiot, Marysville, MI 48040; (313) 364-3338



Cereal City R/C Off-Roaders, 2000 E. Columbia Ave., Battle Creek, MI 49015; (616) 963-2506



Dirt Slingers Raceway, 2460 Edwards, 2460 S. M139, Benton Harbor, MI 49022; Tom Edwards, (616) 927-1431



Fun Tyme High Banked Oval, Fun Tyme Adventure Park, 6295 E. Saginaw Hwy, Grand Ledge, MI 48837; (517) 655-5503



Jonimo Hobby & Raceway, 27788-90 Joy Rd., Livonia, MI; Steven Ollar, (313) 422-1830



Larry's Performance R/C's, 3430 Highland Rd., Waterford, MI 48328; Larry Rossi, (313) 683-5529



Ludington R/C Raceway, 1483 N. Dennis Rd., Ludington, MI 49431; (616) 843-4654



Mason County R/C Car Track, West Shore Community College, (611 N. Washington Ave., Ludington, MI 49431) Scottsville, MI 49454; (616) 843-8553 or 843-4837



Mikey's Raceway, 7 North St., Yale, MI 48097; Mike Huber, (313) 387-4308



More R/C Club, 33538 23 Mile Rd., Chesterfield Township, MI 48047; (313) 773-5918 (Tom Kelly) or 749-9774 (Joe)



NMRCC Raceway, 110 N. Otsego, Gaylord, MI 49735; (517) 732-3963



Pointe R/C, 2119 Summerton Rd., Mt. Pleasant, MI 48858; Frank, (517) 773-5711



R&L Hobbies, 10334 Portage Rd., Portage, MI 49002; (616) 323-3686



R.G. Enterprises, 600 N. Lafayette, Greenville, MI 48838; (616) 754-4919



Rider's Superspeedway, 42040 Koppernick, Ste. 400, Canton, MI 48187; Brent Martin, (313) 451-5599



Rider's Superspeedway, 4415 S. Westledge, Kalamazoo, MI 49008; Ken Penn (616) 349-2666



Thumb Raceway, 3441 S. Main St., Marlette, MI 48453; (517) 635-7848



USA Raceways, 6083 Dixie Hwy., Bridgeport, MI 48722; (517) 777-7USA



Village Hobbies-n-Crafts, 17824 N. Maple Island, Hesperia, MI 49421; Alan or Fran, (616) 854-1374



MINNESOTA

ABC Raceway, 120 2nd St. NW, Pipestone, MN 56164; Ross Lange, (507) 825-5065



Greater Minnesota Racine Place, 3302 Southway Dr., St. Cloud, MN 56301; Jon Jackson, (612) 252-9768



Mac's Models, 80 E. Little Canada Rd., Little Canada, MN 55117; Dean Nelson, (612) 482-7796



Minn-E-Golf & Hobby, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365



The PBR Off-Road Rally, 721 Cedar Ave., Hector, MN 55342; Philip Zempel, (812) 848-2129



Range Racing World, Inc., 412 Jones St., Eveleth, MN 55734; Bill, (218) 744-4423



Range Racing World, Inc., Sherwood Forest Campgrounds, Gilbert, MN 55741; Bill O'Neal, (218) 744-4423



Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 722-6248



MISSISSIPPI

Norm's R/C Hobbies, 310 E. Beach Blvd., Long Beach, MS 39560; (601) 863-0524



Precision Hobbies, 240 Eisenhower Dr., Biloxi, MS 39531; (601) 388-6346



Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST



MISSOURI

Doug's Hobbies, 5221 Veil of Tears, Jefferson City, MO 65109; (314) 893-5861



Gateway R/C Track & Hobbies, 255 Marshal Rd., P.O. Box 345, Valley Park, MO 63088; (314) 225-5844



Harrisonville Hobby Shop & Raceway, 2301 S. Commercial, Harrisonville, MO 64701; Richard Taylor, (816) 887-3055



Lafayette Riverside Raceway, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Laningham, (314) 966-8912



Outback Speedway & Hobby, 2810 Sutton Blvd., Maplewood, MO 63143; (314) 644-3383



R + Hobby, 590 Jungermann Rd., St. Peters, MO 63376; (314) 928-9838



MONTANA

Bozeman R/C Powerhouse Track, west side of the Main Mall, Bozeman, MT 59715; (406) 586-6461



Garden City Raceway, 6725 Hwy. 10 W., Missoula, MT 59802; (406) 721-5405



Magic City R/C Raceway, 14th St. W. & Central Ave., Billings, MT 59101; (406) 259-9004



NEBRASKA

Hobby Town USA, 3404 W. 13th St., Grand Island, NE 68801; Ed Conroy, (308) 382-3451



Over the Wall Gang, Higirowabee Speedway, 401 Market Pl., Norfolk, NE 68701; Matt Moeller, (402) 379-0879



Riverside R/C Raceway, Hwy. 77 S., Fremont, NE 68025; Mike Katz, (402) 727-6835



The Salvation Army, 4032 Harrison St., Omaha, NE 68147-1012; Lt. Michael Delashmit, (402) 634-3414



NEVADA

Little City Hobbies Raceway, 640 Kuenzki, Reno, NV 89503; Gregg Allen, (702) 786-3611



NEW HAMPSHIRE

4-K Racing, 100 Warwick Rd., Winchester, NH 03470; (603) 239-6207



C.T. Hobbies R/C Raceway, 49 Eaton Rd., Auburn, NH 03032; (603) 483-2274



Hobbies Plus R/C Raceway, 14 Celina Ave., Nashua, NH 03063; (603) 882-9200



Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549



R&B Racing, Lily Pond Rd., Gilford, NH 03246; Louie, (603) 524-2909 or Bud (603) 524-1893



NEW JERSEY

Action Raceway & Hobby Center, Rt. 295 & Harmony Rd., Gibbstown, NJ 08027; (609) 423-8933



Dave Bicknell Memorial Raceway, P.O. Box 914, Absecon, NJ 08201; Rob Caruso, (609) 748-8291



Glassboro's Grand Oval Speedway, 167 S. Delsea Dr., Glassboro, NJ 08028; (609) 863-1551



Hopewell R/C Speedway, 138 West Broad St., Hopewell, NJ 08525; (609) 466-2715



Jackson R/C Racing, Marshall Ave., Jackson, NJ 08527; (908) 905-1593



LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122



Pixley International Speedway, 763 Peters Dr., P.O. Box 189, Martinsville, NJ 08836; Richard Toole, (908) 560-0399



The Race Place, Rt. 33 & 34, Farmingdale, NJ 07727; (908) 938-5215



Radical Raceway & Hobbies, 100 Rt. 17S, Lodi, NJ 07644; (201) 843-6996



Ricky G's Raceway, 2208A Hamilton Blvd., South Plainfield, NJ 07080; (908) 753-1518



Tri-Oval Speedway & R/C Center, 296 S. Main St., Phillipsburg, NJ 08865; (908) 454-2223



Truck Challenge, 1162 Rt. 202-206 N., Bridgewater, NJ 08807; Michael Gill, (908) 658-9616



Zeppelin Hobbies, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717



NEW MEXICO

The Pit, Las Cruces Hobby Raceway, 1996-A S. Valley Dr., Las Cruces, NM 88001; (505) 524-8530



Racers Inn, 4300 Rankin Ln. NE, Albuquerque, NM 87107; (505) 345-5988



TRC Race Park, 1303 E. 8th St., Truth or Consequences, NM 87901; Gary Whitehead, (505) 894-3211



NEW YORK

A&D's FastTracks, 1000 N. Main St., Brewster, NY 10509; (914) 279-2065



A&S Race Center & Hobbies, 120 Cayuga St., Canalview Mall, Fulton, NY 13069; (315) 598-2772



Bellmore Raceway, 2479 Charles Ct., Bellmore, NY 11710; (516) 783-3456 or 783-0105



Brockport Speedway, 6000 Sweden Walker Rd., Brockport, NY 14420; Gil & Betty Glidden, (716) 637-6224



Cars R/C & Guitars, 4360 Seneca St., West Seneca, NY 14224; (716) 674-0905



Central New York R/C Auto Racers, Martin St., P.O. Box 116, Rome, NY 13440; John Orr, (315) 336-5140



Chipmunk Hill R/C Speedway, 217 Pine St., Theresa, NY 13691; Ted House, (315) 628-5065



Dirt Track, 17 Fairway Dr., Manorville, NY 11949; Billy Wroblewski (516) 878-0737



East End Off-Roaders, Route 25A at Gull's Square, Wading River, NY 11792; (516) 929-8844



Gamlen's R/C Motor Speedway, 8453 Rt. 11, P.O. Box 1430, Cicero, NY 13039; Dave Wright, (315) 699-2991



GP Racing, 6785 Martin St., Rome, NY 13440; Greg Philley, (315) 336-5140



Island Hobbies & Raceway, 410 Commack Rd., Deer Park, NY 11729; (516) 254-6229



Lakeside Raceway & Hobbies, 712 Willow Ave., Ithaca, NY 14850; (607) 272-0248



Latest Hobbies & Raceway, Rt. 25A, Wading River, NY 11792; (516) 929-8844



LI 1/4-Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384



Maspeth Raceway, Rust St. & 57th Rd., Maspeth, NY 11378; (718) 894-0800



Norwood Hobbies Raceway, 2-4 S. Main St., Norwood, NY 13668; Tom Jarvis, (315) 353-6621



Performance Plus R/C Speedway, The Hobby House, 114 1/2 Jones & Gifford Ave., Jamestown, NY 14701; (716) 488-1772



Queens Off-Roaders, 42-12 13th St., Long Island City, NY 11101; (718) 392-5766



Race O Rama, 44 Sharon Ave., Plattsburgh, NY 12901; James Varno, (518) 562-5442 or 643-2678



KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Automatic lap-counting
- Food available

Track Directory

Raceworld R/C & Hobby, Budd Rd., Phillipsport, NY 12769; Joe Colombo Jr., (914) 754-7664



Rapid Transit Raceway, 2104 Broadway, Schenectady, NY 12306; Al Powell or Dick Crounse, (518) 372-0777



R/C Competition Corner, K-Mart Plaza, Mattydale, NY 13211; (315) 455-8718



R/C Hobbies, Rt. 49 Box 138, Constantia, NY 13044; Roy Catholdi, (315) 623-9536



R/C Speedway & Hobbies, 1555 State St., Watertown, NY 13601; Steve Pena, (315) 788-1320



Riverside R/C & Hobby, P.O. Box 125, Rt. 126, Beaver Falls, NY 13305; (315) 346-1682



Rochester Raceway & Hobby, 1725 N. Clinton Ave., Rochester, NY 14621; George, (716) 467-2427



Rock River Model Hobbies, RD 2, Box 297, Rock River Rd., Interlaken, NY 14847; Carl Schmidt, (607) 532-9489



Russet's R/C Racetrack, 1793 Ridge Rd., Ontario, NY 14519; (315) 524-2522



Schenectady R/C Speedway, 955 State St., Schenectady, NY 12307; (518) 370-3747



Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600



Skaneateles Raceway & Hobby, P.O. Box 102, Rt. 20, W. Genesee St., Skaneateles, NY 13152; (315) 685-8077



Small Torque Racers of Long Island, 24 Horton Dr., Huntington Station, NY 11746; George Franz, (516) 271-1119



South Shore Hobby & Raceway, 311 W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567



Team Earthquake, The Hobby House, 114 1/2 Gones & Gifford, Jamestown, NY 14701; (716) 488-1772



Transit Speedway & Hobbies, 5319 Transit Rd., Depew, NY 14043; (716) 684-7368



Wall's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291



Western New York R/C Speedway, 58 Spring St., Cuba, NY 14727; Jason Congdon, (716) 968-3586



NORTH CAROLINA

C&H Raceway, 1400 N. Cannon Blvd., Kannapolis, NC 28081; (714) 933-5321



Cape Fear Speedway, 207 Harley Rd., Wilmington, NC 28401; Bob Justice, (919) 762-1184



Carolina R/C Drag Assoc., 907-C Warsaw Rd., Clinton, NC 28328; (919) 592-9489



Charlotte R/C Raceway & Hobbies, 5820 Old Concord Rd., Charlotte, NC 28213; (704) 597-0608



Clinton R/C Raceway, 907-C Warsaw Rd., Clinton, NC 28328; Corbitt Marshburn (919) 592-9489



Granite City R/C Raceway, 192-1 N. Main St., Mt. Airy, NC 27030; (919) 786-1466



Hi-Performance Hobbies & R/C Raceway, P.O. Box 320, Earl, NC 28038; Derrell Hollifield, Steve Bliss, (704) 482-4391



Hobby Park, 464 Knollwood St., Winston-Salem, NC 27103; (919) 768-2345



Jacksonville International Speedway, Hwy. 17N, Jacksonville, NC 28540; (919) 346-1522



Joe's Hobby Shop & Raceway, Rt. 2, Box 682-B, Bessemer City, NC 28016; (704) 435-2912



Motorhead R/C Raceway, 125 Park St., Canton, NC 28716; (704) 648-7911



Mountain R/C Raceway, Hwy. 107N, P.O. Box 67, Glenville, NC 28736; (704) 743-3709



Reedy Creek Raceway, Rt. 14, Box 946, Conard Sowers Rd., Lexington, NC 27292; (704) 731-4022



Sandhills Raceway, Inc., US #1 South, Aberdeen, NC 28315; (919) 944-7414



Smiley Face Raceway, 120 W. Center St., Mebane, NC 27302; (919) 563-3822



TLC R/C Raceway, Rt. 6, Box 321-A, Hwy. 601, Mocksville, NC 27028; (704) 492-7569



TNT R/C Raceway, 707 N. Salisbury Ave., Salisbury, NC 28159; Larry Martin, (704) 633-0647



NORTH DAKOTA

Basin R/C Raceway, Basin Hobbies, 2124 2nd Ave., W., Williston, ND 58801; Shawn Wyse, (701) 774-3634



Crystal Springs Off-Road, 1200 53 Ave. SW, Minot, ND 58701; (701) 852-9590



OHIO

Alcraft's R/C Raceway, 1370 Custer-Orangeville Rd., Brookfield, OH 44403; (216) 448-1573



American Raceway, 234 Robbins Ave., Niles OH 44446; George Nikoloff, (216) 544-5455



Classic Hobbies & Raceway, 2845 W. Waterloo Rd., Akron, OH 44312; (216) 628-3222



C/R Hobbies Top Race Track, 4914 Main Ave., Ashtabula, OH 44004; Virginia Gagat, (216) 992-3833



D&J R/C Raceway, 801 W. Market St., Orrville, OH 44667; Don Yoder or Mark Nussbaum, (216) 682-4266



D&S Hobbies Raceway, 7701 Crile Rd., Concord, OH 44077; (216) 354-2112



Hi-Tech Hobbies II, 116 Taylor St., Loveland, OH 45140; Rick, (513) 683-8900



Hobby Mania Raceway, 6597 Route 224, Lowellville, OH 44436; (216) 536-8282



Innovative Hobbies/Lakeside Speedway, 3427 Manchester Rd., Akron, OH 44319; (216) 645-1333



KAR R/C Raceway, 14511 Seacrest Rd., Salem, OH 44460; (216) 537-4039



Mid-Ohio R/C Raceway, 5367 Fishburg Rd., Huber Heights, OH 45424; (513) 233-2807



Strongsville, Speedway, 13315 Prospect Rd., Strongsville, OH 44136; (216) 572-0430



Trusso's R/C Raceway, 100 W. Crain Ave., Kent, OH 44240; Bill, (216) 673-0422



Turn 4 Hobbies, 112 W. Main St., Van Wert, OH 45891; Virgil, (419) 238-6840



Way Out Hobbies, 5583 Centerpoint Rd., Georgetown, OH 45121; (513) 375-4984



Woodlane Raceway, 2300 E. Dorothy Lane, Dayton, OH 45420; Jeff Simpson, (513) 298-1166



Y-City Hobby & Speedway, 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (614) 455-3025



OKLAHOMA

Off-Road R/C Autos of Tulsa, 13349 E. 11th #B, Tulsa, OK; (918) 251-5592



OKC Raceway, 6707 NW 10th, Oklahoma City, OK; (405) 495-4820



RCRC of Oklahoma, 400 S. Vermont, Ste. 104, Oklahoma City, OK 73108; Robert Jones, (405) 942-RCRC



Wild Country Speedway, S. Main, Porter, OK 74454; Charles, (918) 483-8111



Wings & Things, 5241 S. Peoria, Tulsa, OK 74105; Dave Hendon, (918) 745-0034



OREGON

Buggy Boogie Race Track, Rt. 4, Box 546, Astoria/Knapa, OR 97103; (503) 458-5357



Ed's Dirt Speedway, 2809 N. Cherry St., La Grande, OR 97850; (503) 568-4332



The Finish Line R/C Raceway, 560 W. 'D' St., Apt. 6, Creswell, OR 97426; Rod Carothers, (503) 895-4395



Mt. Bachelor Radio Raceways, 225 Centruy Dr., Bend, OR 97701; Rex Baldwin, (503) 389-6160



R/C Plus Hobbies Raceway, 2029 25th St. SE, Salem, OR 97302-1130; Ron Smith, (503) 364-9188



R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501; (503) 779-8298



Thunder Road, R/C Hobbies, 1624 Williams Hwy., Grants Pass, OR 97527; (503) 479-8701



Yamhill County R/C Car Club, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234



PENNSYLVANIA

Ansolan, 54 High St., Fairchance, PA 15436; Timothy Abraham, (412) 564-9956



Brian's Raceway, 733 Flexer Ave., Allentown, PA 18103; (215) 435-1862



CEB Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Booze, (717) 375-4635



Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch (814) 765-3045



Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506



East St. Raceway & Art Center, 747 E. Railroad Ave., Verona, PA 15147; (412) 826-0602



Henning Scale Models R/C Raceway, 128 S. Line St., Lansdale, PA 19446; Bill Henning, (215) 362-2442



High-Tek Hobbies Raceway, 13250 Rt. 30, N. Huntingdon, PA 15642; (412) 864-5278



Hobby House Raceway, Downingtown Marketplace, Downingtown, PA 19335; J.T. Nelson, (215) 269-1300



Hobby World Raceway, 172 Shillington Rd., Sinking Spring, PA 19608; Mike Wentzel, (215) 678-8760



Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866



L&R R/C Racing, 15 S. Main St., Red Lion, PA 17356; (717) 244-1108



Main Hobby Race Center, 107 Delaware St., Olyphant, PA 18447; Ziggy, (717) 489-4566



Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458



Modellbahn Ott Hobbies, 1145 E. Philadelphia Ave. (Rt. 73), Gilbertsville, PA 19525; (215) 367-5925



New Garden Farms/Mushroom Bowl, 812 W. Cypress St., Kennett Square, PA 19348; Drew Pannell, (215) 444-1850



Performance Hobby, 1305 Main St., Slatington, PA 18080; (215) 760-9855



Phantom, 1520 Montrose, Philadelphia, PA 19146; (215) 545-3769



Prop & Wheels Raceway, 139 W. Broadway, Tamaqua, PA 18252; (717) 668-2288



Radio Controlled Pro Speedway, Rt. 487N, Stillwater, PA 17878; (717) 387-0266



Riverside Raceway, PA Ave. W & Hickory, Warren, PA 16365; Jeff, (814) 723-4211



T&T Radio Controlled Racing, Randolph Rd., Great Band, PA 18821; (607) 723-9357



TC's R/C's, 1537 Freeport Rd., Natrona Heights, PA 15065; Tom Coriale, (412) 226-8802



Wagonhill Hobbyland, RD 3, Box 183, Slippery Rock, PA 16057; (412) 458-4711



RHODE ISLAND

East Bay Hobbies, 629 Metacom Ave., Bristol, RI 02809; (401) 254-0778



R/C Hobbies, 47 Sandybottom Rd., Coventry, RI 02816; (401) 823-4335



SOUTH CAROLINA

Berea R/C Speedway, 707 Sulphur Springs Rd., Greenville, SC 29611; (803) 246-4702



Inland R/C Speedway, 61 New Found Ln., Myrtle Beach, SC 29577; (803) 293-1753



LB Co. Hurricane, 112 Green Acres Rd., Blythwood, SC 29016; (803) 786-0984



Mid-Carolina R/C Superspeedway, 2222 Wintercrest Dr., Rock Hill, SC 29732; Fred Penland, (803) 328-8278



Monaco's Raceway, 727 E. Buena Vista Ave., N. Augusta, SC 29841; Bill Loursen, (803) 279-8982



Palmetto Raceway, 5023A Rivers Ave., N. Charleston, SC 29418; (803) 566-0068



TBS Superspeedway, Hwy. 151, Darlington, SC 29532; (803) 395-1551 or 332-7117



TBS Superspeedway, 800 Hwy. 15N, Hartsville, SC 29550; Johnny Tiller, (803) 332-7117



Thunder Valley R/C Speedway, 432 E. Church Rd., Easley, SC 29642; (803) 859-2323



SOUTH DAKOTA

Dakota Off-Road Racers, 2989 W. Br. Co. 12, Aberdeen, SD 57401; (605) 226-0604



TENNESSEE

D&M's Downtown Raceway, 8 North White St., Athens, TN 37303; (615) 745-4288



The Dirt Dome, 575 W. Poplar Ave., Memphis/Collierville, TN 38017; (901) 853-3428



Lail Speedway, 812 Wells Rd., Maryville, TN 37801; Jack or Chris, (615) 983-9207



Tuckasee Off-Road Raceway, 1104 Lafayette Rd., Clarksville, TN 37042; (615) 645-2635



TEXAS

AA Raceway, 1617 Toomey Rd., Austin, TX 78704; (512) 474-8277



Austin R/C Center, 9702 Gray Blvd., Austin, TX 78758; Caton Cobb, (512) 832-8144



Budget Raceway, RR 1, Box 400 I-35, Bruceville, TX 76630; (814) 859-5296



Checkered Raceway, 8100 Kirkwood, Houston, TX 77072



Competition Hobbies Raceway, 309 W. Hwy. 190, Copperas Cove, TX 76522; Larry Gholson, (817) 547-7505



Finish Line Hobby Store & Raceway, 11925 Jones Maltsberger, San Antonio, TX 78016; (512) 491-0088



Hal's R/C Raceway, 1440 Bessemer, El Paso, TX 79936; (915) 591-2213



Hi-Tech Hobbies & Raceway, 1107 Port Neches Ave., Port Neches, TX 77651; (409) 724-2315



Indy R/C World, 220 Mesquite Village, Mesquite, TX 75150; (214) 686-7744



Norm's R/C Hobbies & Raceway, 2551 Lombardy, Ste. 160, Dallas, TX 75220; Norm Mazzola, (214) 357-3453



R/C Pro Shop, 3303 N. Midkiff, Midland, TX 79705



Spring Creek R/C, 45 Fisherman's Rd., San Angelo, TX 76904; (915) 944-3850



TK's R/C Park, 2921 Old Claude Hwy., Amarillo, TX 79101; (806) 622-0017



Ty's Toys & Raceway, 129 John Stockbauer, Victoria, TX 77901; Ty Dorsey, (512) 575-6154



Wild Bill's, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Jerry Williams, (214) 438-9224



Z Track, 1550 Dunnam Dr., Abilene, TX 79602; Chi Chi, (915) 692-8477



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- Dirt oval
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- Concrete
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Track Directory

UTAH

Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044; (801) 250-8303



W.O.R. Raceway, 3150 Brinker Ave., Ogden, UT 84401



VERMONT

Bradford R/C Racing, Fairgrounds Rd., Bradford, VT 05033; Rodney Sherburne, (802) 222-9224



Hansen Intermountain R/C Raceway, 8481 W. 2700 S., Magna, VT 84044; Kevin Hansen, (801) 250-8303



Mike's Hobbies & Raceway, 162 N. Main St., Rutland, VT 05701; Stephen Rachlis, (802) 775-0059



Silver Towers Raceway, Elks Club, North Ave., Burlington, VT 05401; (802) 658-4490



VIRGINIA

A-1 Raceways, 940 Radford Rd., Christiansburg, VA 24703; Kay or Charles Franks, (703) 382-1173



Bob's Hobbies & Raceway, 910-J Brandy Creek Dr., Mechanicsville, VA 23111; Bob Wagner, (804) 746-2758



Cooper's R/C Raceway, Rt. 4, Box 12203, Chatham, VA 24531; (804) 724-4182



Crossroads Hobbies R/C Raceway, 1104 W. Main St., Salem, VA 24153; Ronnie Black, (703) 387-3414



Front Royal R/C Racing Association, Chester St., P.O. Box 1252, Front Royal, VA 22630; Roger Stoots, (703) 636-2637



Lane's End Raceway, P.O. Box 153, Bridgewater, VA 22812; Tony Strother, (703) 828-6655 or 3471



Mid Atlantic Raceway, 89 E. Elizabeth St., Harrisburg, VA 22801; (703) 433-3952



Precision Hobbies & Raceway, 4000 Mechanicsville Tpke., Richmond, VA 23223; Larry, Don, Chance, (804) 329-8051



The Race Place, 3180 King William Ave., Westpoint, VA 23181; (804) 843-4933



Sterling Truck & Auto Racers, 20921 Davenport Dr., Sterling, VA 22170; Ron Beckman, (703) 444-0333



The Tilt-yard, Rt.1, Box 235A, Dayton, VA 22801; Homer W. Allman, Jr., (703) 828-3471 or 828-6655



Winners Circle, 3236 W. Clay St., Richmond, VA 23230; (804) 355-7076



WASHINGTON

Alfie's, 108 South K St., Aberdeen, WA 98520; (206) 533-6638



Arlington Heights Speedway, 13629 228th St. NE, Arlington, WA 98223; Shawn Bussert, (206) 435-3442



Four Seasons R/C Racing, 146 School St. SE, Olympia, WA 98506; (206) 491-2430



Hank Perry Race Complex, Sullivan Rd., WA 99213; (509) 927-1879



Tacoma R/C Raceway Hobbies, 6305 6th Ave., Tacoma, WA 98406; (206) 565-1935



WEST VIRGINIA

Fairmont R/C Raceway, 430 Fairmont Ave., Fairmont, WV 26554; Ed Kirby, (304) 363-5509



Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26003; James Fulton, (304) 233-5355



R/C Race Place, Rt. 10, Box 351, Morgantown, WV 26505; (304) 292-0811



WISCONSIN

Fox Valley Off-Road Racing Club, R1, Mayflower Rd., Hortonville, WI 54944; (414) 739-9211



Frog's R/C Raceway, Rt. 1, Phillips, WI 54555; (715) 339-2314 or 339-2958



Hobbytown Speedway, 4231 8th St. S., Wisconsin Rapids, WI 54494; (715) 421-1222



Hobby World Speedway, 3198 London Rd., Eau Claire, WI 54701; (715) 834-0456



JJ's Dirt Heaven, 6028 County K, Champion, WI 54229; (414) 866-9096



Maniac Motors Raceway, 244 Rt. 1 A1 Rt. H, Kendall, WI 54638; (608) 847-4833



MARCCA Raceways, 1810 S. Park St., Madison, WI, 53713; Jeff Gundlach, (608) 273-0519



Midwest Tri-Clone, 144 N. Main St., West Bend, WI 53095; (414) 334-0487



The Pits Hobby Shop, 786 Morris Ave., Green Bay, WI 54304; (414) 494-4200



Radio Mania, 129 Harrison St., North Prairie, WI 53153; Bill Bowes, (414) 392-9515



R/C Raceways & Hobbies, 181 W. Marquette Ave., Oak Creek, WI 53154; Ralph & Cathy Augustino, (414) 764-9701



R/C Spectacular, Milwaukee Mecca Auditorium, c/o Wisconsin Motorsports Show, 11020 W. Rogers, Milwaukee, WI 53227; (414) 327-3999



Stoltz Raceways, 548 Summit Dr., West Bend, WI 53095; (414) 338-6097



West Bend Hobbies, 144 N. Main St., West Bend, WI 53040; (414) 334-0487



BRAZIL

Hobby Center, SQS.210 Bl.H Apt. 204, Brasilia, DF-Brasil 70.273; 061-242-0488



CANADA

Aprilia Track, 20 Parsons Ridge, Kanata, Ontario K2L 2N4; (613) 836-2577



Autodrome des Laurentides, 1003 Rue Lauzanne, Bellefeville, Quebec J7Z 5L8; Jean-Marc Morin, (514) 431-7241 or 438-0907



Autodrome des Prairie, 935 Boul. St-Luc, St-Luc, Quebec J0J 2A0; (514) 348-0718



Autodrome Sher-Hobby, 1035 Panneton, Sherbrooke, Quebec; (819) 820-1151



Cantraxx Raceway, 8876-48 Ave. SE, Edmonton, Alberta T6E 5L1; (403) 469-9193



Circuit R/C Bonzai, 164 Cowie, Granby, Quebec J2G 3V3; (514) 372-3622



Circuit St-Denis Auto Téléguidée, 292 DuLion, St-Denis sur Richelieu, Quebec, J0H 1K0; Francois Rivard, (514) 787-1127



Crash Course, Box 9, Site 8, RR #1, Spruce Grove, Alberta T7X 2T4; Tim Starreveld (403) 963-5795



CRCD, 4565 8h St-Joseph, Drummondville, Quebec J2A 1B4; Jacques Lefebvre, (819) 474-4001



GRSCR, 9 Gauthier, St-de L'Achigan, Quebec J0K 3H0; (514) 588-4254



Honda House Motor Speedway, 384 Richmond St., Chatham, Ontario N7M 1P9; (519) 354-5530



J-T International Raceway, 127 Milligan Ln., Napanee, Ontario K7R 8A1; (613) 354-0099



Quintrax Speedway, Box 1034, Belleville, Ontario, K8N 5B6; (613) 962-1414; Fax; (613) 962-7306



Rousillon Hobby Track, 177-D St-Jean Baptiste, Chateauquay, Quebec J6K 3B4; (514) 698-2151



Universal R/C Speedway, Niagara St., Welland, Ontario; (416) 735-5051



JAPAN

Misawa R/C Raceway, 13th Fighter Squadron, PSC 76, Box 2585, APO AP 96139-2585; 011-81-176-53-5181, ext. 226-6506



MEXICO

Hobby's Formula, Au observatorio 457, Mexico DF 01120; (905) 502-3620



R/C Baja Rosarito, Paraiso Ranch, Rosarito Beach, Baja California; 011-526-612-0495



SPAIN

ROARCR, Naval Station, Rota, Spain (P.O. Box 53, FPO NY NY 09540-0013); PO Kelly Sexton, 011-34-56-822652



ZIMBABWE

Mosi-Oa-Tunya, H9619 Highland Harare, Harare Country, Masloraland, Zimbabwe; 46237



SCOPING OUT

(Continued from page 98)

brothers, but there was very little heat build-up during actual use.

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(Continued on page 142)

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SCOPING OUT

(Continued from page 139)

especially in the stock or sportsman classes, and I think it's the least expensive, truly HF, motor-drive controller available—affordable, smooth trigger response, longer runs and a motor that runs more coolly.

If you've looked at the specifications, you've seen the price (\$102), and you might be saying, "Is this guy nuts? That ain't cheap!" But remember that's the *manufacturer's suggested retail price*. You can always find one for a lot less!

*Here are the addresses of the companies mentioned in this article:

Tekin Electronics, 970 Negocio, San Clemente, CA 92672.

Litespeed, P.O. Box 4765, Spokane, WA 99202.

Sermos R/C Snap Connectors, Cedar Corners Stn., Box 16787, Stamford, CT 06905.

GET STARTED

(Continued from page 79)

commutator cleaning stick to remove carbon deposits from the commutator surface.

(Continued on page 151)

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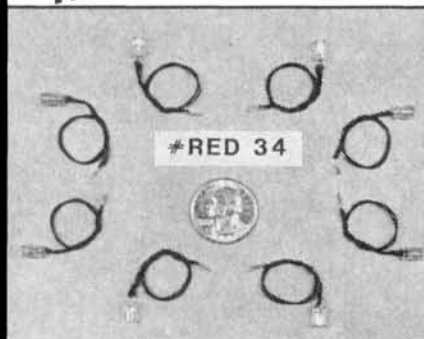
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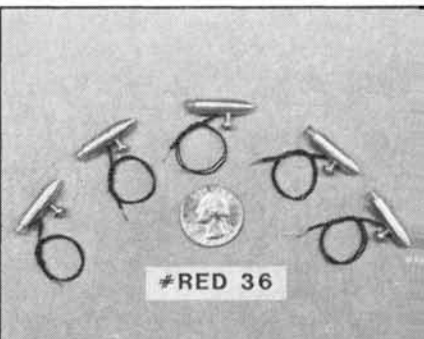
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GET STARTED

(Continued from page 142)

Inspect your brushes for wear. Replace them after every four to six runs, or when their edges are discolored. Eventually, brush springs lose strength owing to heat and constant tension. For good performance, replace them with about every second set of brushes. Lube the bushings or bearings with one drop of high-quality oil. Over-lubrication won't enhance performance; it could actually foul the commutator.

Clean and re-lubricate all accessible bearings, e.g., wheel bearings/bushings. You can use motor spray to remove dirt from your bearings effectively. Drain the motor spray and then re-lube the bearings with a bearing/bushing lubricant. You'll be surprised at how much dirt these tiny bearings can pick up. Carefully re-install them by pressing on the outer rim of the bearing, not on the inner race.

You should periodically remove the transmission, disassemble it, clean it and lubricate it. Use your motor spray to degrease diff parts, but take care not to blast your diff balls halfway across the room! Re-lubricate with the manufacturer-recommended lube and reassemble the diff. While your transmission is disassembled, check the bearings for wear, and clean and lube them. They may not look dirty, but dirt gets into transmission bearings. Be particularly careful with the outdrive support bearings. They tend to bind when they're dirty, and this will rob your motor of power and, in extreme cases, make the car hard to handle.

Inspect ball joints for looseness, and check rods and links for bends. Replace anything that's questionable. Inspect suspension parts for freedom of movement and the loss of E-clips. If any parts bind, remove the pivot shafts. Your car will only handle well if its parts move freely.

(Continued on page 154)

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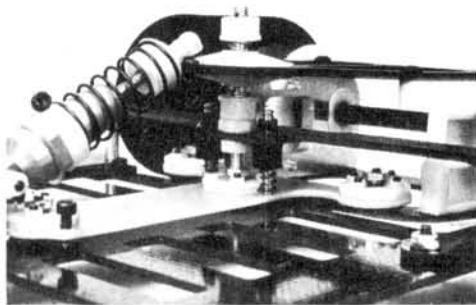


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GET STARTED

(Continued from page 151)

Inspect dogbones and universal joints in the drive shafts. I like to lubricate these parts with a dry-film lube like Paragon* Liquid Bearing or Ultralon. Wet lube picks up dirt and holds it, but dry lube doesn't. When you reassemble your car, you'll be ready for any competition.

I hope these articles have been helpful. To be a top driver, you must practice; to fine-tune your driving skills, you must seek out the toughest competition and drive against the best. This will force you to pay closer attention to car preparation and to concentrate harder on your driving. These are the real keys to success in R/C racing.

*Here are the addresses of the companies that were mentioned in this article:

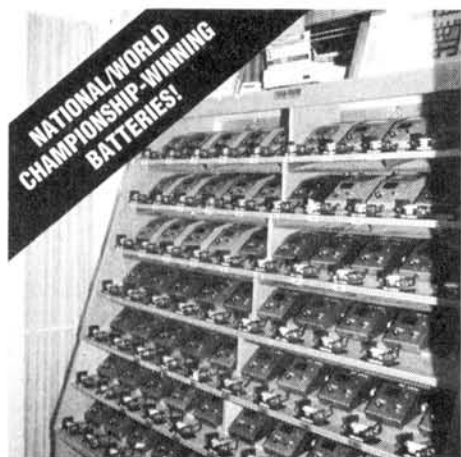
Cobra International, 2415 Lafayette Blvd., Norfolk, VA 23509.

Gecko Electronics, 3714 El Camino Real, Santa Clara, CA 95051.

Bold Creations, 1305 Abbey Rd., Round Rock, TX 78681.

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PHOTOS BY STEVE POND

AMERICANS HAVE always had a love affair with cars. Anyone can tell you about their first car—from its color right down to the last detail about where the ashtray was. For me, it was a yellow '61 Dodge Pioneer with a 318ci engine. (The ashtray was under the radio.)

We, of R/C glory, fondly remember our first R/C cars, too, even after time and technology have passed them by. My

first pan car, purchased almost three years ago, was a Bolink* Gold, and although I've learned its limitations, I still have a soft spot in my heart for it. I

was pleased to be asked to review Bolink's newest car—the LTO Superspeedway. ("LTO" stands for "left

turn only"; you definitely

don't want to use this car on a roadcourse!) This car is narrow, which is an indication that Bolink has accepted a sign of the times—narrow cars are here to stay.

**Bo (link)
knows
ovals**



by LARRY COLE

Bolink LTO SS

LTO SS

The front end of the LTO SS is similar to that of the standard LTO. The chassis had to be cut to provide clearance for the front wheels during turns.

PICK OF THE PARCELS

When the UPS man arrived, I immediately recognized the large box that held my 1/10-scale pan car and its body. (It clearly *wasn't* the box for my wife's *Home Shopping Club* special of the day!) After I had opened it, I sat down and scanned the instructions to prepare myself for the task ahead. I soon realized that this car is similar to the standard LTO. It comes with bearings, a pro-style axle, a mounted set of front and rear tires and a clear, Pontiac Grand Prix body.

Bolink's instructions are excellent! The assembly steps are specific and clear, and each one is accompanied by a detailed drawing. There are also seven photographs of the car taken

most identical, the photos provided are fine. The only major difference is in the rear pod, and a separate, detailed drawing of that section is included.)

WHAT'S THE DIFFERENCE?

Before I assembled the new LTO SS, I "unbuilt" my standard one so that I could compare the two piece by piece. Much to my surprise, the cars' main chassis were almost identical. The new "narrow" chassis is actually as wide as the standard one, and all the bolt holes and battery-slots are in the same locations.

The major difference is the cutout on the front of the new car's chassis. This was made to allow narrow axle/wheel clearance when the car is turning. Also,

i.e., steering blocks, spacers, etc. The shocks are the same, as is the rear axle, although the people at Bolink told me that the final production car will come with a shorter one.

Not only is the new car's rear pod narrower, but it also has a one-piece alumi-

keeps the axle centered in the pod, which improves the car's handling. The pod is also equipped with ride-height adjusters.

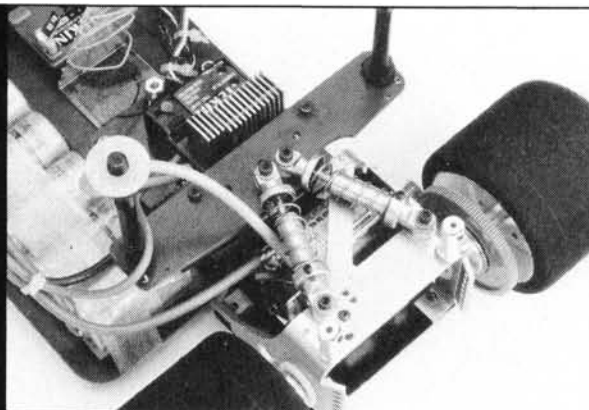
BOLINK BUILDING

Assembly begins with the front axle. The front suspension consists of the standard fare, i.e., floating kingpins with coil springs, but the springs are much softer than those used on the older Bolink. The front end allows for easy caster adjustment, but camber is still limited by how well you can bend the front spindles.

In the rear pod, there's a standard T-plate with a floating-pivot setup that allows the T-plate to operate more smoothly than a fixed-grommet setup. Its only drawback is that it's hard to keep the no. 2 flat-head screws in place. I recommend that you put Loctite* on them and put a drop of CA on the bottom of the ball housing.

(Continued on page 160)

The one-piece rear pod is much lighter than the three-piece version used on the original LTO. Notice the notch in the upper graphite plate. This provided clearance for the pod in the prototype. The kits now come with longer rear shock-mounting plates that avoid this problem.



from different angles. If you're ever in doubt about how it should look, just refer to the pictures. (Note: the pictures actually feature the regular, wide LTO but, since the two cars are al-

there aren't extra battery slots on the right side. Unless creativity is your thing, you'll have to run with the batteries on the left. The front axle is different, but the front end is the same,

num design. This type of pod, which was originally sold as an option for the standard LTO, is a great heat sink. It's much stronger and lighter than a three-piece assembly, and it

LTO SS

Manufacturer Bolink
 Type On-road
 Scale 1/10
 Price \$269.95

DIMENSIONS:

Overall Length 13.5 inches
 Width 8 inches
 Wheelbase 10.125 inches
 Front Track 7.5 inches
 Rear Track 8 inches

WEIGHT:

Gross (with battery) 2 pounds, 9.6 ounces

BODY:

Type Pontiac Grand Prix
 Material Polycarbonate

CHASSIS:

Type Pan
 Material Graphite

DRIVE TRAIN:

Primary Pinion/spur
 Transmission Direct drive
 Differential Ball
 Bearings/Bushings Ball bearings

SUSPENSION:

Front: Type Kingpin
 Damping Coil-spring
 Rear: Type T-plate
 Damping Two oil-filled shocks

WHEELS:

Front: Type 1-piece plastic
 Dimensions (DxW) 2.125x1.1875 inches
 Rear: Type 1-piece plastic
 Dimensions (DxW) 2.5x1.5 inches

TIRES:

Front Blue foam
 Rear Green foam

ELECTRICS:

Motor Not included
 Battery 6-cell pack*
 Speed Controller Not included

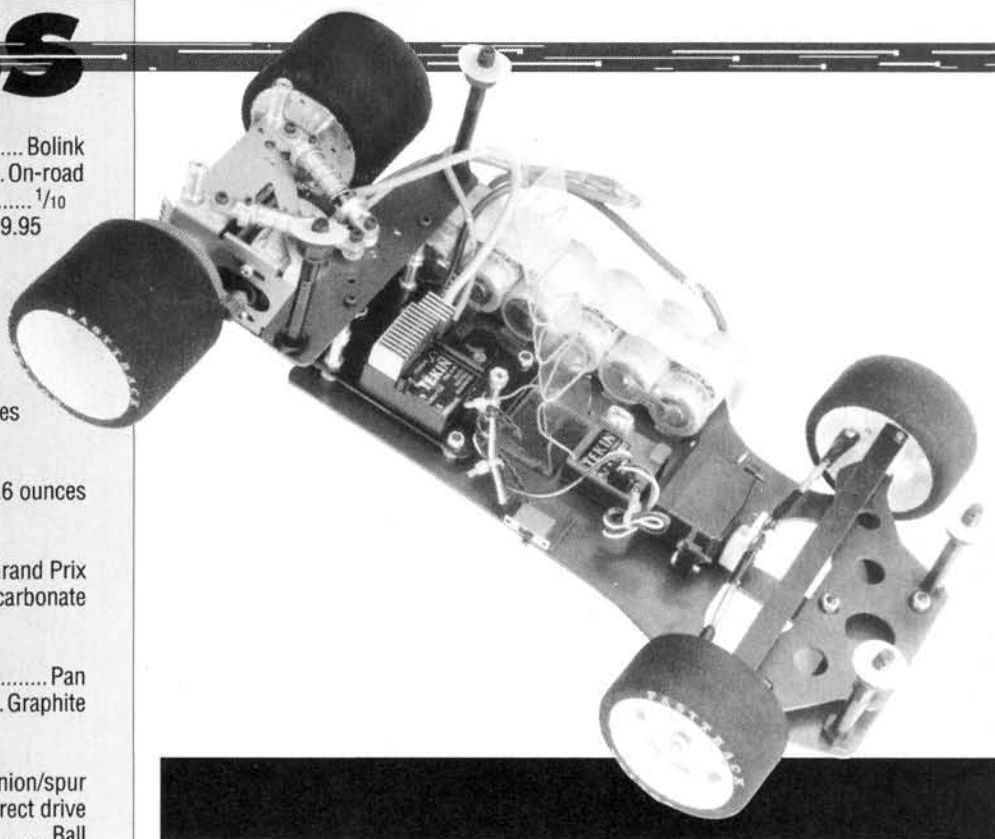
OPTIONS AS TESTED:

Reedy Mr. H 12-turn motor; Trinity Pushed SCE batteries; Tekin 411P and TERX 75 receiver; Futaba Magnum Jr. radio and 132 servo; Magic Motorsports* spur gear.

COMMENTS:

For a narrow car, the LTO SS is very stable. It's race-ready out of the box, and it uses ball bearings and a pro-style axle. Twin shocks with additional mounting locations make it easy to adjust the car for different tracks. If you use the above receiver/controller combo, you'll have to add weight to the car. For the money, this is the most impressive narrow LTO car on the market. I wish it were possible to adjust the front-end camber, though.

* not included



(Continued from page 159)

The rear suspension has a twin shock setup with the T-plate. (Here's another tip: don't fill the shocks according to the instructions; instead, use only five or six drops of the included silicone fluid in each.) Twin-shock setups enable you to position the shocks to suit the track conditions. If you want, you can use one shock and position it in the center of the pod. I don't like that setup, but do whatever works for you! To start, it's best to use the two holes next to the outside edge of the one-piece pod. The fi-

nal addition to the rear suspension is the stabilizer bar.

Here are a few words of caution on assembly: you must apply Loctite to every screw that's not held in place with a locknut. Trust me! It's important to prevent parts from coming loose because of vibration.

FINAL PHASE

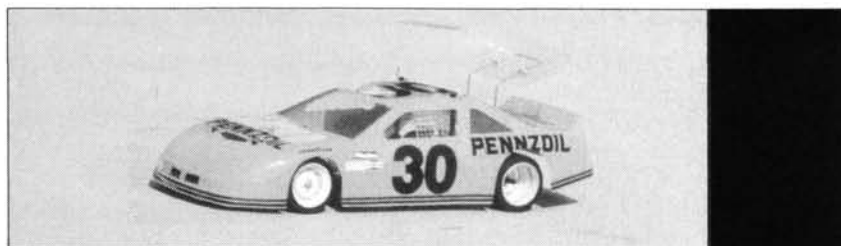
After I had assembled the car, I noticed a major problem. The rear pod didn't flex properly because it hit the shock plate. To solve this, I notched the plate with a grinder to provide clearance. Later, the

people at Bolink told me that the plate mounts in my prototype kit were the wrong ones. Those included in the production kits are longer, and they provide sufficient clearance.

Being of sound mind, and not exactly a painting whiz, I opted to give the body a Pennzoil scheme. A set of Autographics* decals and some yellow paint made this task easy. (Besides, my little guy wanted me to do it...honest!)

I chose a Reedy* Mr. H 12-turn, triple-wind motor. I planned to break-in the LTO SS at

(Continued on page 172)



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NORRCA NATS

(Continued from page 89)

track record-holder Warren Strong Jr. as he bested his own time and took the TQ honors. Local favorite and 9th qualifier, Bob "Trig" Trigger came out of the gates in a big way and stole the 1st round with an impressive win, followed by Sean McCarthy and Strong. Andy "Mr. Concours" Bachelder had a solid run and took the 4th spot.

Round 2 presented some great action as Strong put on his game face and destroyed the competition. Josh Piccirillo took a solid 2nd and John Polakiewicz came home in 3rd. McCarthy dropped way off the pace and finished a disappointing 8th.

There wasn't any doubt about this one: Strong left the field at the line and walked away with the title. Bachelder took 2nd in this heat, followed by McCarthy. The final tally for this class placed Strong 1st, McCarthy 2nd and Bachelder 3rd.

OPEN

Only Bob Richard and Andy Bachelder qualified with more than 37 laps, and I expected them to dominate. Qualifier

(Continued on page 164)

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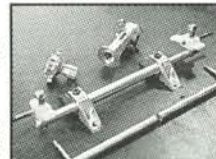
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NORRCA NATS

(Continued from page 162)

number 5, Shane Kocher, had other ideas; he stole the show. Trigger made a solid move to 2nd and held on to the spot. Associated's Frank Killam (10th qualifier), dusted off the cobwebs and moved through the field to finish 3rd. Bob Richard drove steadily and finished a strong 4th.

There was high drama in the 2nd round as Kocher, Killam, Piccirillo and Richard staged a good fight for the lead. At the halfway mark, Killam took over the top spot with Kocher drafting off his rear bumper. As they pulled away from the field, they went at it nose to tail. Kocher tried to drive around on the high side, but couldn't get a good enough run to make it stick. With time running out, Kocher got a little impatient on the back stretch, and he tagged Killam in the rear, sending both cars spinning. Meanwhile, Richard, who was back in 3rd minding his own position, took over the top spot. Killam and Kocher rejoined the race, but by that time, the horn had sounded. Richard took the win, followed by Kocher and Killam.

After the race, J.R. Sitman called a

(Continued on page 168)

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NORRCA NATS

(Continued from page 164)

drivers' meeting to discuss the finer points of driving, and he asked for their indulgence. I think they got the hint!

With three drivers still in the hunt for the top spot (Kocher, Richard and Trigger), there was a lot of electricity in the air for the final run of the weekend. True to form, these three went to the front and waged a war down to the final seconds. Trigger was the first across the line, followed by Richard and Kocher. Since the rest of the field knew that only one of these three drivers could take the title, there were some outstanding displays of

sportsmanship on the track. The back markers were never a problem.

When the standings had been compiled, there was a three-way tie for 1st! Each driver had a win and a 2nd-place finish. Taking into account each of the drivers' qualifying spots, Richard was declared the winner, with Trigger 2nd and Kocher 3rd.

Without the help of track officials and sponsors, an event like this wouldn't be possible. Sincere thanks to Bill Lee and his crew at Foxhill Raceway for hosting the event. Special thanks to these sponsors for their support and assistance: Associated Electrics, Tekin, Novak, Trinity, McAllister Racing, Dan's R/C Stuff, Rac-

ers Choice, ERP, Robinson Racing, TRC, JACO, Cobra, Bud's, B&B Software, HPI, Fantom Motors, SpeedCraft and Holeshot Racing Products.

**Here are the addresses of the companies mentioned in this article:*

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BLUE EAGLE

(Continued from page 104)

the truck's rear handling was loose, and this kept me in 5th place. After a few weeks of testing, I discovered that using the slightly stiffer black springs on the rear shocks and 20WT oil in all four shocks improved the truck's handling.

All the modifications paid off; my Project Blue Eagle performs much better than the stock version. (The latest word from Traxxas is that most of my modifications will be incorporated into a new Blue Eagle kit.) Now, all those who scoffed at my Traxxas truck are eating its dust!

*Here are the addresses of the companies mentioned in this article:

Traxxas Corp., 12150 Shiloh Rd. #120, Dallas, TX 75228.

Litespeed, P.O. Box 4765, Spokane, WA 99202.

Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.

Tekin Electronics, 970 Negocio, San Clemente, CA 92672.

RCD, 9419 Abraham Way, Santee, CA 92071.

JR Propo; distributed by Hobby Dynamics Distributors, P.O. Box 3726, Champaign, IL 61826.

Pro-Line USA, P.O. Box 456, Beaumont, CA 92223.

Team Losi, 13848 Magnolia Ave., Chino, CA 91710.

Reedy Co.; distributed by Associated.

Team Smooth, 311 SW 79th Terrace, North Lauderdale, FL 33068.

DA Graphite, 1235 Portola Ave., Spring Valley, CA 91977.

HOME-BUILT

(Continued from page 106)

case so that he could mount it as far as possible from the rear axle. This way, more tension could be placed on the drive belt. The rear diff setup is much simpler than the Lambo's, and it's easier to dismantle and clean. Joe glued the motor to the chassis and aligned it with the rear diff pulley.

(Continued on page 172)

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Frank Masi
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HOME-BUILT

(Continued from page 170)

The five N-size cells just wouldn't fit. They were stuffed in at a variety of odd angles to fit in the '33 Ford's convoluted shape. The receiver fits right below the roof (without its case, of course). At this stage, the car looked like a pile of parts with wheels—ugly and unwieldy; and that's exactly what it was!

But wait! No speed controller! For nine months, Joe tried to come up with a way to deliver the power. He finally tried a circuit board from a 1/4-scale servo. He was reluctant to try it, because it cost nearly \$60, but he was sure that it would work.

The transistors on the circuit board overheated instantly. Joe rummaged through some electronic parts and found two NPN and two PNP 10A transistors. They did the trick, and the motor screamed with delight. Now, however, Joe had to configure the circuit board into a circuit cluster that would fit between the motor and the axle. This was a 30-hour job that any electronics expert would tell you was a foolhardy time killer and unlikely to be successful; but Joe is a hardy fool, and it worked.

The car's performance was so outstanding that Joe decided to make a new body with real metal parts. Using his Unimat 3 and a file, Joe replaced all the "chrome" parts with real polished-aluminum ones. The grill alone took more than 30 hours to make. Joe painstakingly made the outer frame with a grinder and a small file, and then he glued the polished stainless-steel bars in place. He also made working headlights and taillights and a gas cap. While he was at it, he also made a "ZZ" emblem for his transmitter. He then painted the model with bright red enamel as a finishing touch.

Hats off to Joe Gaczol: the Mighty Mini-Model Maker! ■

LTO SS

(Continued from page 160)

the Hobby World Raceway in Connecticut, and I knew that this track could handle the power this motor would generate. A set of Trinity pushed SCEs give the ponies their "hay," and I use a Tekin* 411P electronic speed controller and TERX 75 receiver and my Futaba* Magnum Jr. radio.

(Continued on page 187)

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LTO SS

(Continued from page 172)

During the first few practice laps, I took it easy to get a feel for the narrow car. After I had dialed-out some of the steering, I felt more comfortable with it, and I turned it loose. The "whooshhh" that it made as it flew by told me that it had some serious horsepower! Could the LTO SS handle this power going into the tight turn three of the teardrop-shaped oval? The answer was a resounding "yes"! The car didn't quiver, hiccup, or waver as it flew through the lowest part of the turn and shot out to the front straightaway. The big, sweeping first and second turns didn't pose any problems either. I was amazed! I had virtually dropped this car onto the track the way it came out of the box, and it out-handled my wide LTO to which I had made many modifications during the course of three years!

The car had a tendency to oversteer, but I solved this using harder-compound front tires. (A stiffer right, front spring would have done the same thing.)

If you think that Bolink doesn't know what it has, then guess again. Although the company hasn't developed many parts for the standard LTO, it has already released additional speed parts for the LTO SS, and a front spring kit with springs in a variety of tensions (to help you fine-tune the car) is on the way. A set of machined, Delrin hubs (they're lighter, so they enable the car to accelerate more quickly) and a new, rear, shock plate with more shock-mounting locations are available now.

It's time for another myth to be dispelled. Many have complained that the standard Bolink car is slightly overweight. Fear not with the LTO SS! It weighs 2 pounds, 9.6 ounces with all the race trim, including a wing. To be legal, it has to weigh 2 pounds, 10 ounces, so I added some lead to it.

On any superspeedway, the new Bolink SS LTO will be second to none. It's quick, light and durable, and it handles like a dream. Bolink introduced the LTO design to R/C racing in the first place, and now the company has taken that design and made one of the best narrow LTO cars in the country. Bo(link) knows LTOs!

*Here are the addresses of the companies mentioned in this article:

Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30294.

Loctite Corp., 4450 Cranwood Ct., Cleveland, OH 44128.

(Continued on page 190)

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LTO SS

(Continued from page 187)

Autographics of California, 7401 White Ln. #1,
Bakersfield, CA 93309.

Reedy Co.; distributed by Associated Electrics,
3585 Cadillac Ave., Costa Mesa, CA 92626.

Tekin Electronics, 970 Negocio, San Clemente, CA
92672.

Futaba Corp. of America, 4 Studebaker, Irvine, CA
92718.

Magic Motorsports; subsidiary of Trinity Products,
1901 E. Linden Ave. #8, Linden, NJ 07083. ■

LETTERS

(Continued from page 10)

HELP

I own a Futaba MC112B speed controller.
I want to put Sermos Power Pole connec-

tors on the motor wires, but they're blue
and orange. Which one is positive and
which negative? I plan to use them on the
battery connectors next. Your help is ap-
preciated. Super mag!

KEVIN STEINMETZ
Madison, WI

Kevin, the orange wire is positive and the
blue one is negative, but regardless of
how you connect them, the motor will run.
The only problem you may encounter is
that the direction of the motor will be
reversed. If this happens, you can simply
reverse the leads without damaging the
motor. JH

PERFORMANCE FIZZLE

I just started working with R/C cars. I own
a Traxxas Bullet with a Joel "Magic"
Johnson Speedworks motor, a Futaba
Magnum Sport radio and a mechanical
speed controller. When I first ran the car
with the Speedworks motor, I noticed that
its performance dropped. My dad said this
motor wasn't right for the controller. If
the speed controller is the problem, can
you recommend an electronic unit?

CHRIS CAFIERO
North Brunswick, NJ

Many factors could have affected your
car's performance. The Speedworks mo-
tor is a 1990 stock motor, and it's fairly

(Continued on page 199)

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R-12 Stock

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LETTERS

(Continued from page 190)

potent. (It's probably much faster than the motor that came with the car.) Although it's hard to tell from what you've written, perhaps there's a problem with the motor itself. Do the gears mesh correctly? Did you use the proper pinion gear? Are the brushes worn or stuck? Examine the motor before you spend money on a new controller. JH

NARROW VERSUS WIDE

In the January '92 issue, you did a story on the Lynx II SS. I have two questions about the article. Where did you get the decals that were used on the finished car? I've never seen the Elliot set, but I want one badly. My second question involves the type of Lynx kits that are offered. We have a club at work, and we run on a flat asphalt parking lot (we may add a road track). The car in the article is basically a high-bank oval car. Which type of Lynx is best for flat-oval racing? I own two Bolink basic cars, and I'm just getting started.

TOMMY FOREST
Anderson, SC

The paint scheme on the body used for the Lynx II SS was created by Richard Muise in his series of articles on preparing and painting Lexan bodies. (They started in the July '91 issue and ran through the October '91 issue). In the final article, he discussed how to detail bodies. The large Coors decals were computer-cut by Custom R/C Graphix (4138 Boston Rd., Bronx, NY 10475). This company can make decals for just about any design you want, but they cost more than mass-produced decal sets.

On flat-oval tracks, I recommend that you use a wider car. Narrow cars work well on banked courses because their small front ends suffer less from aerodynamic drag, and their narrow chassis improve straight-line stability. Wider cars can handle the corners well, so they work better on flat courses and roadcourses.

FM

ASTUTE READER

I'm a big fan of your magazine. I own a Tamiya Astute, and it runs really well! I replaced the stock motor and the speed controller with a Reedy Mr. T modified and a Novak 410-M5 ESC. I was impressed with the speed. (I race every week,

(Continued on page 210)

KILLER CLOD PARTS!

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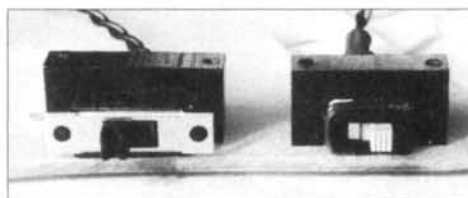
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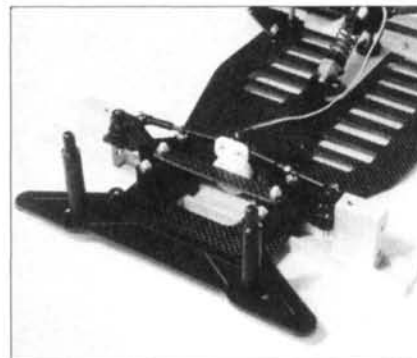
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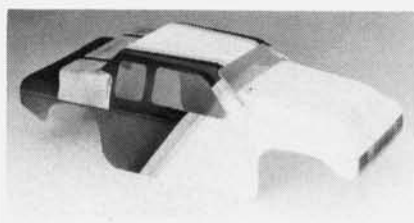
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WHAT'S NEW



JAMMIN' PRODUCTS Lamborghini Truck Body

Jammin' Jay's new Lamborghini truck body is designed for today's monster-truck racing. It's narrow and has a raised hood so that you can mount it lower than you would most truck bodies. It also features a large "gas tank" at the rear, and this enables it to clear the shock towers of the RC10T and the Team Losi LX-T. It comes with mounting instructions, and it's also available custom-painted.

Part nos. J-202 (clear); J-212 (painted).

Prices: \$19 (clear); \$39 (painted).

For more information, contact Team Losi, 13848 Magnolia Ave., Chino, CA 91710.



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HPI RC10L Chassis Brace

The HPI Chassis Brace and Roll Adjuster stiffen the main chassis and increase your RC10L's roll-adjusting capabilities. The roll adjuster stiffens the rear end, and this produces quicker steering response and improves the car's stability out of corners and on straightaways. The chassis brace reinforces the main chassis and helps the suspension to work properly.

Part no. 8005

Price: \$25

For more information, contact Hobby Products International, 22600-C Lambert St., Ste. 904, El Toro, CA 92630.



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This caddy will hold up to 15 gears or pulleys. Hardened-steel pins hold your valuable pinions securely. The gears are protected because they're held in place vertically instead of rattling around in your toolbox! A number identification decal is included.

Part no. 1560

Price: \$8.95

For more information, contact Sassy Chassis, 906 Ridgewood Dr., Cary, IL 60013.



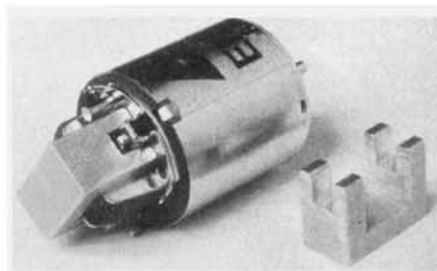
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For more information, contact Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626.



ERP Hood-Alignment Tool

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For more information, contact Endurance Racing Products, 826 N. Lamb, Las Vegas, NV 89110.



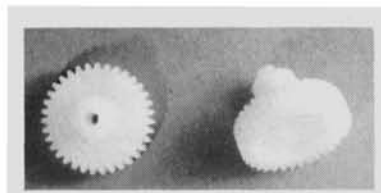
DAHM'S RACING BODIES Commando

The Commando fits the RC10T like a glove—so tightly that you can actually attach the body to the sides of the aluminum tub frame with Velcro® to keep dirt out! The Commando comes with mounting instructions for the JR-XT. It's made of strong, light .030-inch-thick GE Lexan, and it has super-narrow, aerodynamic "fastback" styling, a large hood scoop (for shock clearance), roll bars, rear tarps, an escape hatch, dual recessed gas caps, rear vents that can be cut open, number plates and a separate racing spoiler with mounting hardware.

Part no. D197

Price: \$19.98

For more information, contact Dahm's Racing Bodies, P.O. Box 360, Cotati, CA 94931.



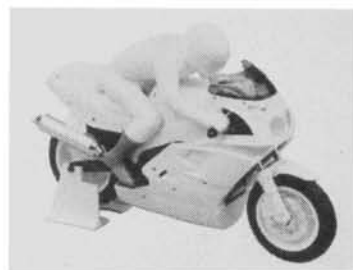
THORP MFG. JR-X2 48-Pitch Outdrive Gears

Use these machined Delrin outdrives for a smooth-running gearbox. They have wider teeth, and they're very durable.

Part no. 5112

Price: \$15/pair

For more information, contact Thorp Mfg. Inc., 4054 E. Mission Blvd., Pomona, CA 91766.



ROYAL PRODUCTS Motorcycle Semi Kit

All you have to add to this 1/5-scale, assembled motorcycle is a radio and a speed controller. The Hyperspeed package consists of a high-speed gear set, semi-pneumatic treaded tires, a 540 motor and a racing suspension. The unit has a removable, anti-roll, training extension with skid wheels; a servo-actuated shifting ballast that provides smooth, realistic cornering (patent pending); a maintenance-free drive belt; a launch stand; and an unpainted body. It requires a standard 7.2V flat Ni-Cd battery (not included).

For more information, contact Royal Products Corp., 790 W. Tennessee Ave., Denver, CO 80223.

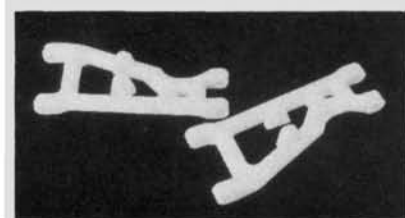


BUD'S RACING PRODUCTS Jaguar XJR-14

The aerodynamic lines of this 1/12-scale Jaguar XJR-14 body make it stable and give it a lot of downforce. It's sure to be popular on both indoor and outdoor tracks.

Part nos. 1001 (Jaguar XJR-14); 1001SL (Jaguar XJR-14 Lightweight).
Price: \$11.95

For more information, contact Bud's Racing Products, 1575 Lowell St., Elyria, OH 44035.



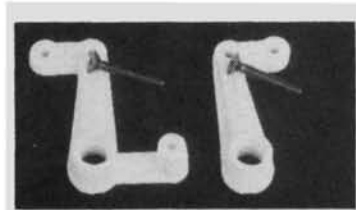
RPM RC10T Arms

These RC10T rear arms are direct replacements for Associated stock arms. The shock-mounting positions are slightly higher to allow more down-travel and to prevent the dogbones from binding. The RC10T front arms are .030 inch longer on each side than the stock arms. Both sets are made of tough nylon that can be dyed, and are designed so that sand and pebbles don't get caught in their ribs. They fit snugly and move freely on the hinge pins.

Part nos. 7030 (rear); 7040 (front).

Price: \$11.95/pair

For more information, contact RPM Custom Engineered R/C Products, 14978 Sierra Bonita Ln., Chino, CA 91710.



MIP Ball-Bearing Steering Kit

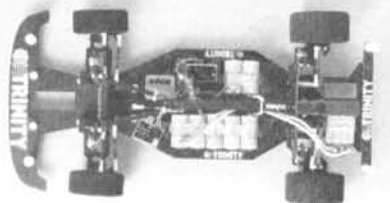
MIP's ultra-light, ball-bearing steering system is strong, smooth and durable because it's made of glass-filled nylon, and it comes with Teflon-sealed ball-bearings. Eliminate side play and bump-steer with ease: these kits are direct stock replacements.

Part nos. AS-50 (RC10); AS-100 (RC10T).

Prices: \$19.95; \$21.95.

For more information, contact Moore's Ideal Products, 746 E. Edna Pl., Covina, CA 91723.

WHAT'S NEW



TRINITY PRODUCTS ReFlex 10 Oval

Designed by ROAR and NORRCA National Champion Jim Dieter, the ReFlex 10 is a highly advanced, 2WD, dirt-oval car. It has a totally enclosed, direct-drive transmission; a graphite chassis; drive shafts made of an ultra-light graphite composite; adjustable rear toe-in; a rear-engine design to increase traction on slippery tracks; suspension arms machined from graphite composites; a longitudinal chassis stiffener; and 18-inch caster steering blocks for improved cornering.

For more information, contact Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036.



ROBINSON RACING PRODUCTS Light Pinions

Robinson Racing's Titanium Gold pinions are popular among racers worldwide. Now, they've been lightened to decrease their rotating mass! (They're half the weight of solid pinions.)

For more information, contact Robinson Racing Products, 165 N. Malena Dr., Orange, CA 92669.

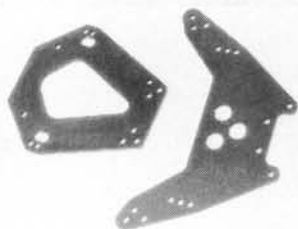


TRINITY PRODUCTS Ground Zero

This super-fast, 15-turn, single-wind outlaw stock motor has an awesome top end and low, 5-degree timing, so it won't burn your brushes! The Speedworks-based motor has 4.9 wet magnets but no ball bearings, and it can turn 32,000rpm. It's recommended for use with any on-road oval car.

Price: \$28

For more information, contact Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036.



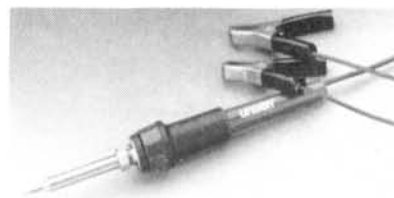
PARMA RC10T Shock Towers

Replace your RC10T fiberglass shock towers with Parma's two-piece aluminum shock towers. They're designed to improve your truck's handling and traction and give better performance and increased run times. They're made of a very rigid material that prevents unwanted movement and forces the shocks to do the work.

Part no. 12835

Price: \$24.95.

For more information, contact Parma International, 13927 Progress Pky., North Royalton, OH 44133.



UNGAR 12V RaceIron

Now Ungar's soldering power goes anywhere you do with the easy-to-use 12V RaceIron. Attach the two grip clamps to any 12V car battery. In 30 seconds, you'll be able to melt solder; in 2 minutes, you'll have full power. The RaceIron enables you to do on-the-spot, at-the-track jobs without an outlet. An extra-long, 12-foot cord is included.

For more information, contact Horizon Hobby Distributors Inc., 3102 Clark Rd, Champaign, IL 61821.

Descriptions of new products appearing on these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Radio Control Car Action**, nor guarantee product performance or safety. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Radio Control Car Action**.

LETTERS

(Continued from page 199)

and I've won three times!) I'd like to see a "Track Report" on the Tamiya Astute in a future issue. Keep up the good work.

EDMUND JOHNSON
Harvey, IL

Edmund, we published a "Track Report" on the Tamiya Astute in the March '90 issue. Copies of this and other back issues of Car Action are available through Air Age's mail order service. (To order them, call 800-871-5169.) Tamiya has released an updated Astute—the Super Astute—and there will be a full "Track Report" on it in the very next issue! Congratulations on your victories; keep up the good work yourself!

FM

ACCOLADES

This letter is written to recognize and thank two of the finest business people I know.

Jim and Kay Taylor, owners and operators of The Winners Circle Race Track and Hobby Shop on Clay St. in Richmond, VA, go far beyond what's necessary to give their customers good service.

They create a pleasant atmosphere for all who want to race and enjoy the R/C hobby. Their professionalism and friendliness are noticeable from the time you walk in the door until the time you leave.

Unfortunately, such people seldom receive the recognition they deserve, because they're "givers" and, all too often, their efforts are taken for granted.

Racing is racing, whether it's with full-size cars or R/C cars, and people often become "intense" during the heat of the race. On occasion, it takes a Herculean effort to run a race without a lot of problems. Jim and Kay, however, have the knack and, week after week, they provide a place for us to enjoy our hobby.

I want them to know that they aren't taken for granted and that their constant giving—to their customers and to the R/C sport—is appreciated. If there were an award for service given to small businesses in Richmond, Jim and Kay Taylor would certainly deserve it. They're truly winners and are an asset to the business community.

A GRATEFUL CUSTOMER
Chester, VA

It's nice to know that there are still people who care. After all, R/C was meant to be fun!

JH

GOIN' GRAPHITE

I'm getting ready to buy a Traxxas Hawk, and I wondered if I could make my own graphite chassis by tracing the outline of the stock chassis onto a piece of graphite and buying a bellcrank for it? Thank you.

LUKE MEYERS
Decatur, IL

You can make your own chassis, but Traxxas offers a graphite chassis (no. 4730) that accepts the Traxxas steering bellcrank (no. 1940). With the graphite chassis, you must use the Traxxas Battery Cups (no. 4706) to hold the batteries in place. You'll also need a set of 42mm tie rods (available at most hobby shops) to accommodate the shorter Hawk A-arms. Note: if you use the graphite chassis, you won't be able to use the stock Hawk steering; you'll have to use the bellcranks. AS

ADVERTISER INDEX

A&L Manufacturing	82	Hobby Shack	188-189	Rocket City R/C Specialties	118
Ace Hardware	142	Hobby Warehouse	166-167	RPM Custom Engineering	90
Airtronics	4	Holeshot Racing Products	199	RPS Distributing	80-81
America's Hobby Center	73	Horizon Hobby Distributors	195	S&K Racing Products	10
Andy's R/C Products	129	Indy R/C	8	Saiko Racing Products	82
Associated Electrics	36-37, 48-49, 76, 99, 156, C3	International Model Shows, Inc.	66	Sanyo Energy Corp.	155
AstroFlight	161	JPS Custom Wheels	199	Sassy Chassis	72
Autographics of California	98	JR Remote Control	83	Schumacher Inc.	50, 108
B&B Software	118	Kyosho	C2, 27, 91, 169	Sheldon's Hobbies	200-203
B&R Motor Works	58	Magnum Racing Products	129	Southside Hobbys	186
B&T Racing	190	McAllister Racing	142	Southwest Tire	162
Ballistic Batteries	151	MK Model Products	100	Speed Craft Inc.	86
Boca Bearing Co.	170	Model Craft Manufacturing	163	Stealth Electronics	115
Bolink R/C Cars, Inc.	63	Model Rectifier Corporation	C4	Stevens & Son R/C Products	139
Bruckner Hobbies	140-141	Moore's Ideal Products	30	Stormer Hobbies	152-153
Bud's Racing Products	13	Nationwide Hobbies	198	T&A Machine Products	125
Bullet Racing	90	Novak Electronics	7, 7C	TD Enterprises	82
C&M Team Cobra	19	Omni Models	105	Team Losi	47, 94
Central Model Marketing	65	Paragon Racing Products	9	Team Orion	154
Cheetah Racing	154	Parma International	11, 68, 119	Team SLC	164
Class Recreation	162	PC Hobbies	66	Tech-Toys	162
Competition Electronics, Inc.	15	Product Engineering & Manufacturing ..	72	TEKIN	56
Dahm's Racing Bodies	43	Progressive Technologies	165	The Finest R/C	196-197
Dan's RC Stuff	151	Pro-Line U.S.A.	33	The Inside Line	164
DTN Enterprises	79	Protoform	168	Thorp Manufacturing, Inc.	61, 115
DuraTrax	103	Quick R/C	172	Top Racing Products	79
Eagle Products	21	Raborn Racing Originals	75	Tower Hobbies	174-184
ERI	190	Race Space	164	Track Directory Coupon	139
ESP, Inc.	168	RAm	151	Traxxas Corporation	22, 97, 122
Futaba Corp.	67, 158	R.C.A.S. Monster & Racing Trucks	208	TRC	42, 209
Global Hobby Distributors	92	R.C.C.A. Action Series Subscription	35	Trinity Products	3, 55, 185, 191, 207
Great Northern Hobbies	192-193	R.C.C.A. Buyers' Mart	143-150	Twister Motors	51
HLR Products	139	R/C International	84-85	Ultra ⁵	98, 126
Hobby Centro	125	R/C Motor Sports of Miami	18	Victor Engineering	173
Hobby King	187	Retailer Ad	54	Walt's Hobby	162
Hobby Products International	194	Robinson Racing Products	45, 130, 171	Wanted	172, 187